Suomalais-Ugrilaisen Seuran Toimituksia
Mémoires de la Société Finno-Ougrienne
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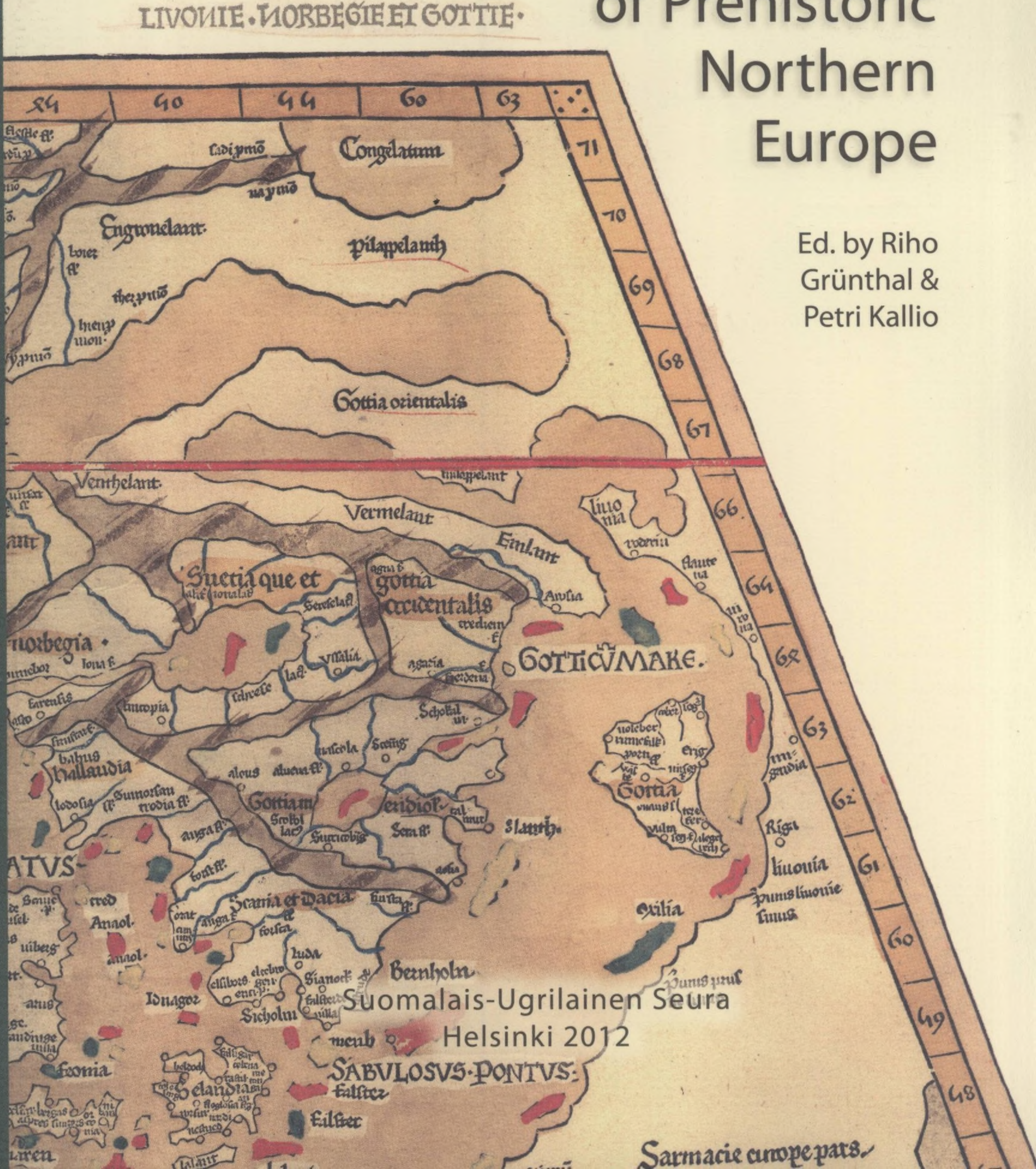
A Linguistic Map of Prehistoric Northern Europe

Ed. by Riho
Grünthal &
Petri Kallio



Suomalais-Ugrilainen Seura
Helsinki 2012

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Layout & image editing on pages 4, 8, 64, 126, 127, 128, 136, 139, 151, 157, 165, 202, 262, 301, 303 MA Anna Kurvinen
Language supervision PhD Uldis Balodis
Map on the cover Claudius Ptolemy [1598], *Scandia, sive, regiones septentrionales* (The National Library of Finland, The Nordenskiöld Map Collection)

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Société Finno-Ougrienne — Finno-Ugrian Society
& the authors

This publication was supported by the Academy of Finland (project number 214246) and the University of Helsinki

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ISBN 978-952-5667-42-4 (print)
ISBN 978-952-5667-43-1 (online)
ISSN 0355-0230

Vammalan Kirjapaino Oy
Sastamala 2012

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Preface

The topics of this book were first discussed during an international workshop organised in Rakvere, Estonia, in October 2008, funded by the Academy of Finland. In the longer run, they have been the subject of recent research of prehistory and emerge from this same research area. The title of the symposium *Linguistic Map of Prehistoric North Europe* was also applied to this volume, which, in its final version, serves as a more limited forum for the dialogue between archaeology and language. In prehistoric studies, this tandem has a long tradition, and there definitely is much to be found in the future, as well.

The dialogue between archaeology and linguistics as represented in this volume has its predecessors in interdisciplinary communication. In Finland, this tradition, though actually derived from early interdisciplinary academic interests and research at the beginning of the 19th century into the history of the Finns, shares the heritage of the book *Suomen väestön esihistorialliset juuret* 'The prehistoric roots of Finland's population' edited by Jarl Gallén (1984), followed by *Pohjan poluilla* edited by Paul Fogelberg (1999). Both are nationally oriented focusing on long-term cultural and linguistic development in the area of modern Finland. Both volumes were published in Finnish and addressed predominantly to a Finnish readership, whereas the results were never made accessible for an international readership. A parallel study on the origin of the Swedish population in Finland was published some years later in Swedish *När kom svenskarna till Finland?* 'When did the Swedes come to Finland?', edited by Ann-Marie Ivars and Lena Huldén (2002).

Some decades earlier, ethnohistory and ethnogenesis were topics that were widely discussed in the Soviet Union under the generally severe post-war communist totalitarian rule of the 1950s. Most frequently, this was discussed in an anthropological framework and the volumes published during that era typically included contributions by archaeologists and linguists. In post-war Estonia, a thematic compilation on the ethnic prehistory of Estonians was published under the title *Eesti rahva etnilisest ajaloost* 'The Ethnic History of the Estonian People', edited by Harri Moora (1956).

Given that Northern Europe is one of the main areas in which the Indo-European and Uralic (alternatively Finno-Ugric with a minimal difference in meaning) languages have been in contact and overlapped with each other's geographical distribution already during the Neolithic era, both language families as subjects of historical linguistics are involved in the discussion. The importance of different Indo-European loanwords in the stratification of early Uralic variants in the northern Baltic Sea area has been a persistent topic in interdisciplinary research of ethnohistory since Vilhelm Thomsen's seminal works *Den gotiske sprogklasses indflydelse på den finske* (1869) 'The influence of the

Gothic language class on Finnic' and especially *Beröringer mellem de finske og de baltiske (litauisk-lettiske) sprog* (1890) 'Contacts between the Finnic and Baltic (Lithuanian-Latvian) languages'. Since then the contacts between the Uralic and Indo-European languages have been considered an invaluable factor for the analysis of the development of prehistoric Finnic varieties and the dating of linguistic phenomena and relative chronology of language change.

The most recent predecessor to the current volume, an international thematic volume in English, *Early Contacts between Uralic and Indo-European: Linguistic and Archaeological Considerations* edited by Christian Carpelan, Asko Parpola, and Petteri Koskikallio (2001), emphasises the importance of linguistic and cultural contacts for the development of prehistoric ethnic relations over a wide geographical area in Northern Eurasia. The contributors to that volume also demonstrated the need to extend the discussion to the international research community. Articles dealing with the prehistoric linguistic landscape of Northern Europe and cultural connections over a wide geographical area in Northern Eurasia include contributions by 18 internationally acknowledged archaeologists and linguists. Many of the articles provide a valuable up-to-date overview and new conclusions from research into ethnohistory.

Finally, the necessity to embrace several disciplines in the discussion of prehistoric matters is one of the primary themes of the subseries *Archaeology and language* I–IV (1987–1997) by Colin Renfrew, Roger Blench (ed.), and Matthew Spriggs (ed.) of *One world archaeology* (London: Routledge). These volumes promote discourse between archaeology and linguistics in different areas around the world and identify areas in need of further study based on the evidence resulting from this dialogue.

Compared with the publications mentioned above, the current volume sheds more light on Northern Europe, a relatively well-researched area, by bringing new evidence concerning language contacts and the development of cultural areas. Regardless of the change of theories and new hypotheses concerning cultural and linguistic continuity in various areas, continuity in research enables a gradual accumulation of information.

Support to our project with the same focus was provided by the Academy of Finland and the University of Helsinki. We are indebted to PhD Uldis Balodis for language supervising of the texts published in this volume.

❧

Despite the extremely strong integration of the modern international community, the weakening of political borders, and intensive mobility, modern cultural and linguistic entities have their roots in early prehistory. Units that are labelled as a people and nation have their background in communities that consisted of peoples with a very different sense of space and time than we have today.

Prehistory is the place where people often seek the explanation for the diversity of languages and differences between the cultures and human life described by documented history. The understanding of the modern world, and the multiple layers of social life, takes place through time, and explanations of the restructuring, rise, and fall of societies with different cultural and linguistic characteristics. This constitutes human interest into past, undocumented ages and the story of the prehistory of Northern Europe. Languages that have been spoken at the same latitudes since the dawn of modern ethnic and anthropological constructions are the key to the development of ethnicity, social and interethnic relations. So is archaeology with a fruitful discourse between datings, discoveries, and its modern orientation that estimates sociohistoric habits and beliefs behind materials and societies.

Rapid changes in the ethnic and cultural character of the geographical core area during the 20th century and the points made above suggest that there is an urgent need to revise settlement history and challenge the models accounting for linguistic and cultural areas. Not only archaeologists, historians, and specialists of language history value the past – human life, diffusion of culture and language behind the curtain of documented history have a more general value for our understanding of the rise and development of societies that bridges the modern world with past millennia.

The prehistory of Northern Europe is rich in its own unique geographical context, which can be approached from many methodologically plausible and fruitful viewpoints. The more detailed questions reflect this broad landscape of interests. Who were the inhabitants of this area? What were their linguistic and cultural networks? How has the ethnic and linguistic situation changed since those days? This is the conversation this book seeks to continue and, which, hopefully, will be carried forward by its successors – a rich lineage of research with its roots in prehistory extending from the past into the future.

September 2012, Helsinki
Riho Grünthal and Petri Kallio

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Introduction: an interdisciplinary perspective on prehistoric Northern Europe

There were no roads. Vehicles with wheels could hardly have been used, if there were any. Animal husbandry took its early steps, just as the cultivation of land did. Geographical distances that could be traversed by foot or via water routes played a much bigger role than borders that appeared at the dawn of modern cartography and are visible in political divisions on modern maps. There were people speaking their own languages, with their own beliefs and practices. They lived in much smaller societies than most of us do today. However, they were in contact with other people, learned from them, and adopted new skills. These people had different means of mobility, communication, and networking. They had learned to live in the northern latitudes with snow and ice in the winter, and long days and short nights in the summer. The framework and many details of this story can be reconstructed by means of subtle archaeological and linguistic analysis and a progressive interdisciplinary dialogue.

Human life in prehistoric conditions was possible and so is research into this life in terms of modern methods and data. This is the starting point of the current book consisting of contributions of specialists of the archaeology and languages of Northern Europe. Before embarking on the points of individual articles and the almost endless array of issues emerging from more detailed approaches to prehistory, it is necessary to outline the empirical and methodological framework in the dialogue between archaeology and linguistics, the main tandem pair in this and many other volumes.

The options are very broad, as numerous aspects must be refined to arrive at a satisfactory answer within a time-depth of several thousand years. It is extremely difficult, for instance, to show the geographical nucleus, core, and periphery in prehistoric language change processes that would be comparable one-to-one with the geographical centres, peripheries, and diffusion in archaeology. Presumably, the centres and peripheries altered over time. However, the point in bridging archaeology and language in areas that lack literary documentation is that despite the need to be careful and avoiding comparisons, which are too abductive, it is reasonable to search for traces of prehistoric languages in areas that were inhabited and had structured forms of social life.

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Empirical evidence

There are no written documents that would adequately report on life, social contacts, and economic routes in the northern Baltic Sea area before the 13th century. What happened there at the time of the Roman Empire and the centuries and millennia before the Common Era, is merely a reconstruction based on what is known from the following centuries and the empirical evidence of archaeology and linguistics. However, the assumptions of prehistoric settlements, their size and dynamics, can be plausible and based on methodological consistency. The reconstruction of prehistory emerges from various archaeological and linguistic data that, in a successful combination of conclusions and implications, outline the past. (For a critical appraisal of the interdisciplinary dialogue between archaeology and linguistics, see Saarikivi & Lavento (2012).)

Archaeology is a discipline that exclusively focuses on the past of material finds, objects that prehistoric people once had held in their hands. In the North, archaeology often lacks the parallel evidence of texts and contemporary documents that foster a versatile perspective on ancient times in the Mediterranean area, for instance. The verbal heritage of texts originates only in the Middle Ages, and the first ones have a very weak connection with concrete geographical areas before the first exact descriptions appear, most notably the Chronicle of Henry of Livonia from the 13th century that describes the German conquest of Latvia and Estonia in a very detailed manner.

Nevertheless, the evidence of archaeology is invaluable because it constitutes the chronology of bits and pieces, organic remnants that people once handled. Archaeology outlines the frame in which other disciplines contribute with their own data. The interpretations made by archaeologists characterize groups of people, societies and contacts between them. The questions and conclusions raising from the dialogue between past and present are based on an inherent interdisciplinary perspective. The birthplaces of innovations and diffusion of techniques and materials draw the routes and borders on geographical areas that can be identified on modern maps. One of the key questions for the analysis of cultural change is whether it also indicates the migration of people. Is it representative of the mobility of just a few individuals or entire groups (Carpelan 1998, Halinen & al. 2008: 421–429).

Language, in turn, inseparably evolves in everyday life, is manifested in new forms, and is in a constant state of change. Language change is evidenced by changes in lexicon, grammar, place names, and interaction; the prehistoric predecessors of modern languages have left their traces in those varieties we use today in our everyday communication both in an oral and literary context. The identification of language change takes place through a careful analysis of words, morphemes, phrases, and speech acts. Ultimately, the list of individual changes that can be identified in the development of the Uralic languages of the northern Baltic Sea area, for instance, is a result of several generations worth of change.

Traditionally, etymology, sound changes, and the influence of language contacts have formed the nucleus of research into the history of the Uralic languages. During the past two decades the empirical basis has been extended considerably. The analysis of onomastic data, though not represented in this volume, applies similar methods with etymology but is more tightly bound to locality, topographic facts, and geographical environment. Grammar, the basis of modern comparative linguistic typology, has not yet been adequately exploited in the discussion of prehistoric language change in Northern Europe.

The point in relying on the evidence of the Indo-European and Uralic languages, both consisting of several subgroups, is that they are not randomly chosen language families. Various Indo-European and Uralic languages are still spoken in many areas where presumably their predecessors were once spoken in the prehistoric era. The Balto-Slavic and Germanic languages have systematic sound correspondences, a common grammatical and lexical basis, which makes them comparable both mutually and with documented language forms. The same is true of the Saamic and Finnic languages, as well as Mordvinic spoken in Central Russia. The correspondences between languages are not random coincidences, but can be accounted for by means of regularity in language change. If these facts can be put in a chronological order and related with a certain geographical area, they can be related to cultural phenomena in space and time.

The evidence of contacts between Finno-Ugric and Indo-European languages for multicultural development during prehistoric time is invaluable, as the loanwords and contact-induced changes attested in Finno-Ugric languages often conserve the characteristics of a certain stage that later has changed in the Indo-European side and typically has taken a different shape in modern Germanic and Baltic languages (Aikio 2006, Kaisa Häkkinen 1996: 149–162, Kallio 1998, 2008, Koivulehto 1997a, 1999 [1979]: 133–160, LÄGLOS, Thomsen 1890). The continuity of contacts extends to relatively recent contacts between individual branches of Indo-European, such as Baltic (Latvian), Germanic (Scandinavian, German), and Slavic (Old Slavic, Russian), and branches of Finno-Ugric languages, such as Finnic (including Finnish and Estonian) and Saamic. These contacts can be identified on the basis of a detailed analysis of lexicon and grammar (Bentlin 2008, Hinderling 1981, Kallio 2006, Must 2000, Söderman 1996, Vaba 1997a, 1997b). Compared to the newer layers, it is not always easy, not even possible to determine the exact Indo-European origin of a given Finno-Ugric word, as both a Baltic and Germanic origin may, in principle, come into question. Considering the age of some typical sound changes shows that there are words originating, for instance, from Indo-European sources that reflect the Proto-Finnic sound changes, such as **ti* > **si* and **š* > **h* (Koivulehto 1984, 1999 [1979]: 133–160).

Generally speaking, the most notable progress in the recent study of the linguistic prehistory of Northern Europe was made in the field of language contact research especially as evidenced in early loanwords. However, it appears that discovering the origins of Finnish and Estonian vocabulary has predominantly been the starting point in the research of the Finno-Ugric (Uralic) languages, although other Finno-Ugric languages, such as Saamic, Mordvinic, and Permic languages, enrich the framework of questions considerably (Aikio 2001, 2004, Grünthal 2002 (cf. also this volume), Kallio 2009, Sammallahti 1999, 2001).

The potential of a broader understanding of the linguistic map of prehistoric Northern Europe has gained a lot of attention during the past decade, as traditional methods have been applied to the research into the Saamic languages, for instance. The shift of language areas, most notably the diffusion of the Finnic languages into Saamic areas was already noticed by previous generations (T. I. Itkonen 1948, 1: 97–109, Wiklund 1911–1912), but more recently, a considerable amount of new analysed data have been presented (Aikio 2007, 2009, Räisänen 1995, 2003, 205, Saarikivi 2004b, 2007; cf. Aikio's article in this volume). Furthermore, the concept of language contacts has been extended to onomastic and substrate studies in the analysis of data that have not been adequately extracted in previous research (Aikio 2007, 2009 Grünthal 1997, 1999, Koivulehto 1997b, Mullonen 2002a, Mullonen 2002b, Pitkänen 1985, Saarikivi 2004a, 2004b, 2007).

The picture of the prehistory of Finno-Ugric-speaking areas becomes more detailed if linguistic data – both identifiable and unidentifiable – are organised by means of relative chronology, and these conclusions are compared with archaeological entities, dating, and diffusion waves. In other words, the time depth needed in the research of prehistoric ethnic relations is achieved by discussing the relationship between the relative chronology of language history and the absolute chronology of prehistoric cultures.

These are but a few examples of the current possibilities of the interdisciplinary research of prehistoric Northern Europe. It is hardly necessary to emphasize the importance of empirical evidence, as both archaeology and linguistics heavily rely on the principle that their results should be reproducible. However, the interpretation of data depends on the chosen perspective that may trigger considerably different insights. Language and culture are not uniform phenomena; they never were. It is the diversity of prehistoric languages, cultures, networks, and routes in which we adventure to discover the linguistic map of prehistoric Northern Europe.

The presupposition for a successful dialogue between linguistics and other aspects in the research of prehistory is, in principle, that language data and cultural diffusion and characteristics share some information of the past. The geographical distribution of a certain prehistoric cultural layer, for instance, can be compared with a certain layer of vocabulary and those technical and social innovations that are reflected in the lexicon (Carpelan & Parpola 2001, Hakulinen 1979: 349–382, Kaisa Häkkinen 1999, 2001, Joki 1959, Koivulehto 1999 [1983]: 229–243, Salo 2008: 51–53, 66–67, 83–103). However, it is difficult to demonstrate an unambiguous one-to-one correspondence between cultural and linguistic areas, as the way cultural and linguistic phenomena change and spread are far from uniform. On the contrary, there is ample evidence that cultural zones do not match with linguistic borders (Hodder 1986, Saarikivi & Lavento 2012).

Hence, the situation was probably not different in this respect during prehistoric eras. This explanatory model is under constant revision, and more emphasis should be put on a modern approach to this issue, assuming that the multiplicity of language and cultural change has considerably affected the development of relations in this particular area. Moreover, different linguistic methods, such as place name research and loan word research, may lead to mutually controversial results. And yet, it would be an understatement to downplay the importance of comparing archaeological facts with language history.

Even the most unique empirical data lose their value, if they are not subsumed to a plausible methodological frame. Modern research funding, for instance, dogmatically insists on new visions and up-to-date methods. As a matter of fact, both archaeology and linguistics have successfully brought new tools and aspects to the research kit of prehistory. The similarities and dissimilarities between modern and ancient worlds often need a prolific understanding of the context in which people and societies were observed. The window to the past presents a consistent dialogue between various disciplines, reconsidering the time span of cultural shifts from the Stone Age to the Early Metal Age and later Iron Age, and the adaptation of language change as evidence in various languages of the given area.

Where is the North?

In the current volume the starting point is the geographical area, namely Northern Europe. Linguistically, the northern Baltic Sea area and its surroundings extending towards the east include an extended continuum of Uralic and Indo-European language varieties, both reaching their northwest edge in Northern Scandinavia. It is assumed that prior to the extension of the Uralic and Indo-European languages into Scandinavia and south of the Baltic Sea, other unknown Paleo-European languages were spoken in this area (Aikio 2004, Ariste 1971, 1981: 9–20, Korhonen 1984: 66–70, Saarikivi 2004a, Wiklund 1896: 7–14; cf. Aikio and Kroonen this volume). However, there is only indirect evidence and the hypothesis has to be proved in terms of etymological and onomastic research by excluding alternative interpretations. The assumption of vanished Northern European languages has been mainly based on Saamic and Finnic place names and vocabulary. So far, it has remained a plausible hypothesis without an unequivocal empirical corpus. Moreover, the assumption about vanished unknown languages is not exclusive, as the existence of a substrate does not imply that the predecessors of the attested languages were not spoken at the same time.

As regards written sources, there is only fragmented information about populations and linguistic groups until the late Middle Ages and the rise of the first urban centres with their economic networks and social and political borders. The earliest possible references to Finno-Ugric populations originate from Tacitus' Germania (98 AD) as he mentions both *aestiorum gentes*, presumably etymologically comparable with the name *Estonia*, and *fenni*, comparable with present-day *Finn, Finland*. However, in both cases the early historical reference should not be mechanically compared with those ethnic labels present in the modern world. On the contrary, the former, for instance, refers to a clearly different geographical area, whereas the latter merely identifies some ethnographic and cultural characteristics, a more southern area on the eastern coast of the Baltic Sea with considerable amber resources (Bammesberger & Karaliūnas 1998, Grünthal 1997: 213–240, Karaliūnas 2003) and posits the given people in the framework consisting of other peoples mentioned in the same text (Beck & al. 1998, Lund 1991a, 1991b, Much 1967, Rives 1999, Thomas 2009). The Finno-Ugric area and the indirect evidence of *aestiorum gentes* and *fenni* are located in the northern periphery of Tacitus' historiography. The development of ethnonyms must be connected with a more detailed analysis of the geographical and ethnic context in different eras (Grünthal 1997, 2001 Koivulehto 1997b).

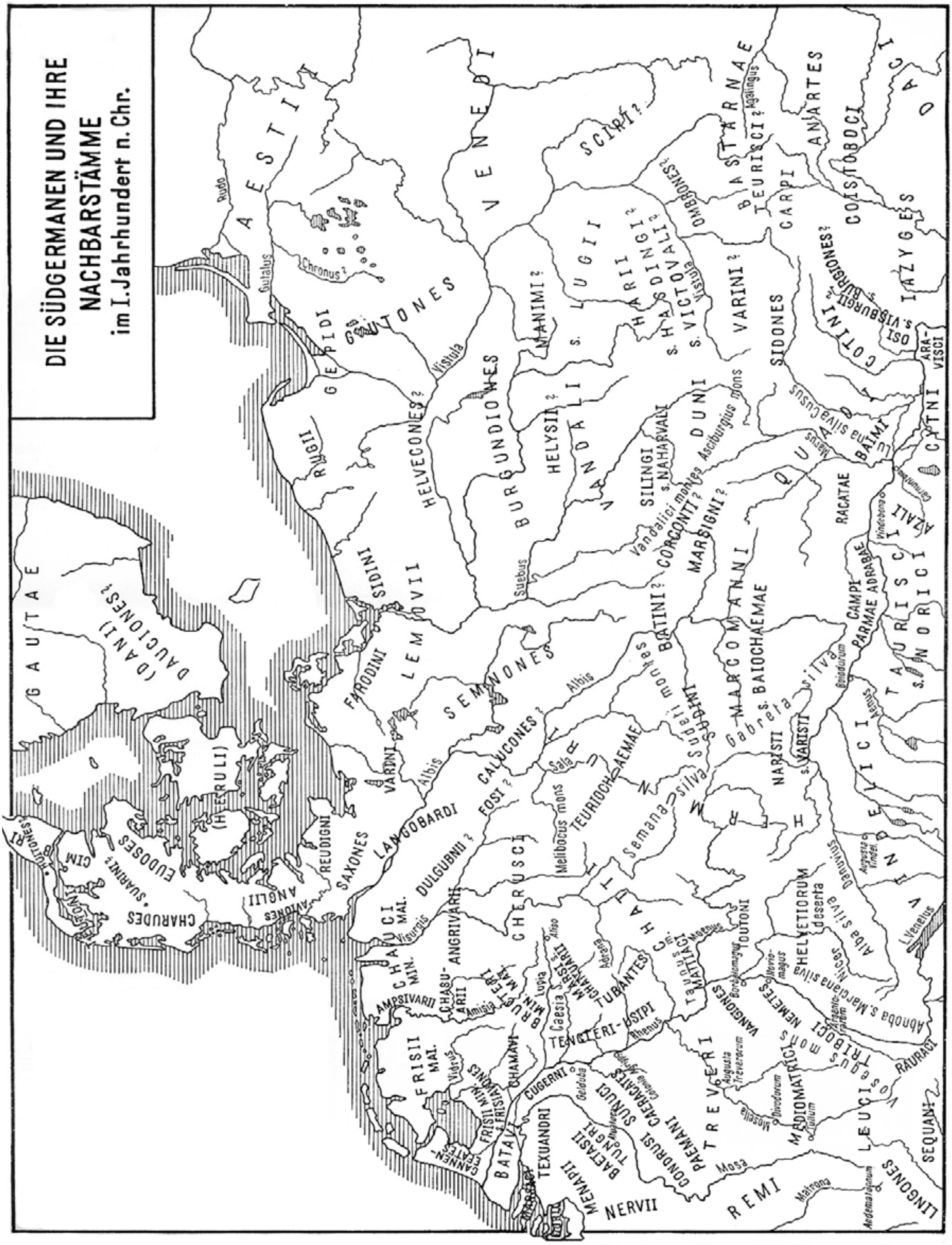
Although travel accounts and secondary reports of the North have a long tradition, no text or map can be fully understood solely from its immediate context, but as a tradition of information of the given area as a whole. The actual meaning of names, random references, and travel accounts often comes from a certain temporal and cultural contexts, whereas the concept of ethnicity may often be misleading or even futile (Valtonen 2008: 25).

The increase of voyagers and the formation of state borders in Northern Europe in the Middle Ages gradually make the geographical coordinates of individual groups more concrete. Both western descriptions such as the Scandinavian sagas in the second half of the first millennium AD and Henry's Chronicle of Livonia from the 13th century presumably written by a German author, and eastern chronicles, most notably the Primary chronicle, the manuscript originating from early 14th century, are important landmarks in the documentation of the Baltic area and the territories under the rule of Novgorod. They, too, do not report on language and networks as perceived in modern research but more often on power and its implementation (Västrik 2007).

In the West, the Vikings, Christianisation, and the establishment of the Catholic church in Scandinavia in the 11th century connected the North more closely with western societies and traditions. The expanding power of the Vatican finally extended to the northern Germania of Tacitus from the southern Baltic Sea area to more northern territories in transmarine Northern Europe.

In the East, the water routes and trade networks led to the Volga River and the Volga Bolgar Empire, later in the 13th century to the Tatar Khanate and Arab world. The first urban centres along the middle flow of the Volga and its bend were built already in the 7th–8th centuries during the Volga Bolgar Empire. The eastern cities sent their explorers to western areas, though to a more marginal periphery in comparison to the southern cities in the Mediterranean and Steppe area that were the main direction of trade routes.

This is the context in which we discuss the characteristics and development of culture and language in the north. The previous research has reached numerous valuable milestones furnished by absolute chronological details or relative implications.



Karte 1 Die Südgermanen und ihre Nachbarstämme im 1. Jhdt. n. Chr.

Map 1. Much's (1967) reconstruction of the geographical distribution of tribes mentioned in Germania by Tacitus in 98 AD.

The time span

In archaeology, the investigated time is mainly determined by findings, which label a cultural layer and are evidenced in scientific laboratory analysis of organic data. The datings of radiocarbon analysis, calibrated chronology and other means of dating determine the age of the investigated objects, which has a large significance for the interpretation of other chronologically-related facts and processes. In principle, language data can be chronologically organised as well, and archaeological and linguistic data together represent the stratification of human life in the flow of time.

The long tradition in the interdisciplinary research of prehistory, however, makes it possible to limit the time span. Our perception of time is, in principle, clockwise, whereas the description of prehistoric processes demands an anticlockwise perspective. This would not be possible without the cumulative information from previous research. Archaeology does not have any considerable constraints with respect to time, because statements and earlier results can always be reconciled in a laboratory analysis. Paleontology, climate history, and the evolution of man demonstrate the extremely long time span of individual remnants. Linguistics, in turn, has much more severe constraints with respect to time, because the earliest literary documents are the only plausible prerequisite.

Mainly due to the constraints of linguistics, the main emphasis in the current volume is on processes that took place during the Early Metal Age and Iron Age. Nevertheless, given the wide geographical area and the continuity of cultural phenomena over time, the scope inevitably extends to the Early Metal Age. From a linguistic viewpoint, the gradual shift from the Neolithic to the Early Metal Age and the increase of populations during the Iron Age provide a chronological continuum against which the development of the vocabulary and grammatical structure of the Finno-Ugric languages, as well as the relative chronology of Indo-European loan words can be projected.

Competing viewpoints: continuity or discontinuity?

The interdisciplinary interpretation of early settlements, cultural types, and language areas has repeatedly yielded the controversy between continuity and discontinuity of habitation, language, and culture. Early Scandinavian records and written sources from the late Middle Ages establish the documentation of language boundaries, ethnic groups, and their environment in Northern Europe. The last millennium includes ample evidence of migration, shifts of borders, restructuring of communities, the rise and fall of centres. On the one hand, the development during the first millennium AD is more difficult to reconstruct, due to the lack of written documents. On the other hand, the considerable increase in population size and more recent traces of habitation often shade the structures and networks of previous centuries and millennia. Linguistically, the main evidence comes from the attested distribution of various Finno-Ugric and Indo-European-speaking communities in Northern Europe, and the implications of long-term mutual contacts.

The main evidence for continuity is based on the fact that after the beginning of the last Holocene, almost 12 000 years ago, it is possible to follow the gradual rise, diffusion, and disappearance of various cultural phenomena. Since the appearance of the first hunters and gatherers in the aftermath of the climate change during the early Mesolithic about 10 000 years ago, the continuity of archaeological findings demonstrates the presence of man. In the northeastern Baltic Sea area the picture is clearer in the territory of the present-day Baltic countries, Estonia, Latvia, and Lithuania, whereas in Finland and Northern Scandinavia there are periods during which the identification of the presence of man is more difficult. In the research of Finnish prehistory, for instance, the Pre-Roman Iron Age during the last centuries BC was considered as a period of complete population break-down in the first half of the 20th century; an assumption that was shared by contemporary linguists as well (Hackman 1905: 353, Kivikoski 1961, Setälä 1916: 499–500).

Accordingly, multiple alternatives were suggested to explain the migration of the Pre-Finns and the appearance of the Finnish language in Finland. Nevertheless, counterarguments were brought into the limelight by archaeologists and the assumed gap in the population was replaced with a new hypothesis emphasizing cultural continuity in Finland (Carpelan 2000, Huurre 1979, Meinander 1969, 1984, Salo 1984, 2008), as it was also alleged in Estonia (Jaanits & al. 1982, Kriiska 2002, Kriiska & Tvauri 207; Lang 2002, Laul 2001: 216–224, Moora 1956). The Finnish linguists adopted this conclusion and adjusted the reconstruction of language history to areal continuity on both sides of the Gulf of Finland (Kaisa Häkkinen 1996: 85–102, Terho Itkonen 1984, Koivulehto 1983, 1984, 1997a, 1999 [1983]: 229–244, Sammallahti 1977, 1984: 142–145).

Later, this view has been scrutinized as well (Jaakko Häkkinen 2010, Saarikivi 2011). Nevertheless, the reconciliation of the migration hypothesis still requires a more profound comparison of earlier and new arguments and data. The existence of Saamic place names in South Finland, for instance, unambiguously shows the historical distribution of the Saamic-speaking population (Aikio 2007, T. I. Itkonen 1948, 1: 97–109), but it does not exclude the presence of other Finno-Ugric languages and early Indo-European varieties.

Recurrent processes in prehistory and reproduced ideas within the investigated topic have gained less attention in research so far. In the discussion briefly quoted above, the leading motive has often been the replacement of an earlier theory with a new one without an appropriate evaluation of the evidence of different data. This claim is predominantly valid for linguistics as the principal means of identifying ethnic groups, their borders, and case-specific characteristics, as language both connects and disconnects people. This divergence in interpretations concerning prehistoric language areas is often caused by the chosen method. Phonological changes, morphological isoglosses, lexical boundaries, loanword strata, and onomastic types are all invaluable for empirical analysis.

The interpretation of different data inevitably gives different results that, nevertheless, do not always exclude the legacy of other interpretations.

The tagging of long-term continuity in language and language areas is based on different layers that are preserved in the body of modern languages and reflect language change over time. Representatives of different paradigms basically agree on this. The diffusion of language, however, is often considered as a unique process that has a concrete time frame. Especially the supporters of migrant theories have favoured this idea. It is also supported by the fact that in the western tradition, pre-modern societies have been consistently described as unstable and unbounded (Anthony 2001: 11). However, considering the recurrence of cultural diffusion, the mobility and prehistoric networking of any speech community, it is obvious that the dynamics of language change include the recurrence of diffusion routes of languages, as well. As a matter of fact, this is more explicitly manifested in the chronology of the Germanic loanwords in the Finnic languages (LÄGLOS), for instance, than in the development of early Finno-Ugric varieties in the northeastern Baltic Sea area.

There is no prevalent method or theory in this book. The main goal is to fill in the gaps of previous research, revise older explanatory biases, and find empirical evidence for the existence of settlements based on the variance in linguistic continuity in Northern Europe. Furthermore, we allege that, generally speaking, there is long-term linguistic and settlement continuity or, at least, those varieties that are known from documented sources and have areal labels, are the key to understanding ethnic prehistory.

To the reader of the articles

The articles published in this volume discuss the areal breadth of prehistoric Northern Europe in terms of language change and cultural networks. The more closely examined areas are Russia and a wider Eurasian context, the northeastern Baltic Sea region, and Fennoscandia. These three areas are conceptually divergent but within prehistoric networks with cultural and linguistic diffusion often overlapping with one another. This fact is reflected in several articles, which actually proves the necessity to discuss the prehistoric North without the constraints of modern borders, centres, and populations.

Individual articles are organised so that the geographical and chronological context and the interpretation of cultural entities is discussed in two archaeological papers by Mika Lavento and Charlotte Damm. These are followed by Asko Parpola's outline of a synthesis of prehistoric development and Tiit-Rein Viitso's more detailed account of the history of metal names in the Finno-Ugric languages. The early development of language areas and the role of language contacts in Scandinavia and the Baltic Sea Area are discussed in the articles of Ante Aikio, Karl Pajusalu, Petri Kallio, Guus Kroonen, and Santeri Junttila. Finally, the more eastern perspective, language change and language contacts in Russia are reconciled in the articles of Riho Grünthal and Villem Vermeer.

Mika LAVENTO discusses the emergence and importance of early agriculture in hunter-fisher populations. Both the environment and technique of early cultivation are considered, as well as different geographical and chronological contexts in light of contemporary data. The periods under focus are the Battle Axe culture, the Kiukainen culture – attested in Southwestern Finland – and the Bronze Age, hence, the late Neolithic and Early Metal Age. The evidence of pollen samples taken from the close neighbourhood of the archaeological sites sheds light on local communities and their mobility, as well. Following the main line of Finnish archaeology, two main areas are separated in the analysis, namely 1) the coastal Bronze Age and 2) the Early Metal Age sites in the Finnish inland.

Charlotte DAMM scrutinizes the compatibility between material culture, ethnicity, and language, and claims that the correspondence is not straightforward. She directs her main criticism against a one-to-one relationship between archaeological categories, regardless of their type, and ethnicity and language. Furthermore, she discusses how knowledge is transmitted at the initial introduction to the craft and exchange may take place under different circumstances. She suggests, for instance, that in northern Fennoscandia inter-communal exchange of knowledge of pottery production happens when potters from different communities meet or when they see pots produced elsewhere.

One of the most puzzling issues for several generations trying to sketch the ethnic and linguistic development in Northern Europe is the story of the Saami, the indigenous people of Scandinavia. Ante AIKIO, a native North Saami speaker himself, presents a great synthesis of what can be said about the role and dynamics of Saami-speaking areas with respect to time and change. The perspective is interdisciplinary, while the evidence is drawn from language with special emphasis on lexical and onomastic data.

Asko PARPOLA's article *Disintegration of Proto-Indo-European and Proto-Uralic in light of archaeology* is a revised synthesis of his earlier paper with Christian Carpelan on the relationship between archaeological cultures and language history (Carpelan & Parpola 2001). His main assumption is that given the long-term continuity of contacts between various Indo-European and Uralic languages in Northern Eurasia and the local culture, it is possible to reconstruct the gradual emergence and evolution of local Uralic (= Finno-Ugric) and Indo-European-speaking communities. The development of the Indo-European and Uralic languages is reconstructed as a long continuum of descendants of the earliest proto-languages, and diffusion from an alleged homeland.

The invention of smelting metals and their working techniques triggered a major change in prehistoric societies. The adoption of metal brought more productive tools and more effective weapons. Tiit-Rein VIITSO points out that the appearance of metal as a raw material left concrete traces in the Finno-Ugric languages. The corresponding vocabulary spread in the Finno-Ugric languages and, to a very large extent, was borrowed from the Indo-European languages.

Language change often takes place through endogenous innovations. Their reconstruction takes place by means of the comparison of genetically-related languages and sub-branches of language families. Karl PAJUSALU gives an overview of certain phonological innovations in the Southern Finnic languages that make this subgroup divergent from other Finnic languages spoken on the northern and eastern side of the Gulf of Finland. This article analyses prosodic changes in speech and sound changes that have affected the phonological inventory. Furthermore, it examines quantitative grade alternation, foot isochrony, and issues of morphophonology in more general terms. So far, this article is the most extensive attempt to reconstruct the rise of southern Finnic isoglosses on the basis of phonology. Ultimately, as the author notes, the existence of the isoglosses has to be contrasted with the influence of language contacts, as well.

Petri KALLIO's article on the Germanic loanword strata in the Finnic languages shows the relative chronology of loanwords of different ages. This particular language contact situation reflects prehistoric networks and, presumably, intensive cultural contacts in the Baltic Sea area. The continuity of language contacts between these two Northern European varieties of the Indo-European and Uralic languages continue until the dawn of documented history and take a more concretely identifiable shape in the Middle Ages. Kallio demonstrates the sound changes that prove the long-term continuity of this particular contact situation that took place in parallel with an extensive cultural change, the spread of agriculture, and an increase in population.

What happened with the languages that became extinct? Are there any substrate strata that reveal something that preceded the documented language situation? Guus KROONEN highlights the hybrid origin of the Germanic languages. It is even maintained that as much as one third of the German lexicon lacks a plausible Indo-European background. This article sheds light on conclusions that can be drawn on the basis of a careful analysis of individual words such as Proto-Germanic (PGm) **arwīt-* 'pea', PGm **gait-* 'goat', PGm **hnit-* 'nit', PGm **hnut-* 'nut', PGm **edis-* ~ **dīsi-* 'lady', PGm **wisund-* 'bison'. These particular words demonstrate that the class of the root nouns was open to loanwords or words with a substrate origin.

Early Baltic influence in the Finnic languages is one of the most classic topics for reconstructing language history and is as important as the evidence of Germanic loanwords for the development of early Finno-Ugric varieties in the northeastern Baltic Sea area. Furthermore, the adoption of loanwords is a part of cultural influence. Loanwords are a special set of *Kulturwörter* that can be approached both from a diachronic and synchronic perspective. This is the classical framework of the etymological corpus of Baltic loanwords in Finnic that Santeri JUNTTILA revisits in his article.

The place and time of the adoption of the Baltic loans has been confined by the fact that the geographical distribution of the Baltic loans in Finno-Ugric extends to the Mordvinic languages. Riho GRÜNTHAL reconciles the question of early Baltic loanwords in the Mordvinic languages, a Volgaic group with two distinct variants spoken on the right side of the middle flow of the River Volga that presumably once played an important sociohistorical role in Central Russia. The assumption of direct contacts between Mordvinic and the Baltic languages, a parallel to the contacts between the Finnic and Baltic languages, was presented already in the 19th century. This article evaluates individual etymologies one by one and concludes that there is unambiguous evidence for direct contacts between the Mordvinic and Baltic languages that took place independently of the more intensive contacts between the Finnic and Baltic languages.

The discussion of the presence and characteristics of the Slavic languages in Northern Europe is gradually added with new information. In his article, Willem VERMEER explains why and how language-internal change took place in Slavic. The development of progressive palatalisation illustrates the gradual rise of borders between genetically-related languages.

Prologue to individual articles

The articles introduced above include several viewpoints about languages, cultures, the sociohistorical and sociolinguistic context of people living in prehistoric Northern Europe. There are several other disciplines such as paleontology, paleozoology, folkloristics, and mythology that are not presented in this volume

We do not aim at one single authoritative synthesis of how the world and human life developed in early times. On the contrary, as prehistoric decades, centuries, and millennia represent a lengthy continuum of time, so is research into issues related to it. There are arguments and assumptions that are not defensible. Although it is important to make generalisations, it is dangerous to oversimplify the rise and change of language communities, whereas it is important to continue to challenge our understanding of cultural centres and peripheries in the prehistoric era. Very frequently, explicit arguments can be brought against vague claims and generalisations based on single traits or insufficient evidence. Less frequently, overarching syntheses based on a comprehensive analysis of empirical data and careful evaluation of earlier research are presented. There is a constant need to reconcile topics that have been intertwined during several decades.

Research that is directed merely towards presenting the absolutely correct questions and finding the right answer is not always the most fruitful method in researching prehistory. However, it is clear that some conclusions are more plausible than others. They should be based on a rigorous analysis of archaeological or linguistic data and, in the best case, a versatile interdisciplinary discussion between various prehistoric programs. What is plausible and what should be rejected can only be determined by means of up-to-date research and the verification of different hypotheses.

We sincerely believe that with the current volume we promote the analysis of core topics – relevant aspects that foster the interdisciplinary research of prehistoric Northern Europe. Ultimately, we welcome new academic enterprises in this fascinating world in the future.

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Cultivation among hunter-gatherers in Finland – evidence of activated connections?

1. Introduction

The emergence of agriculture has often been considered as the breakthrough in human culture. The progress in economy led to the increase in the number of people. Local groups were replaced by new ones and societies grew larger. Since the beginning of agriculture, growing populations needed ever increasing areas for cultivation and animal husbandry. This new situation triggered further changes in hierarchy and social structure, which usually had become more complex than before.

Archaeologists have seen the spread of agriculture as a dramatic process in the region of the Fertile Crescent. Due to its rapidness, there has been reason to call it "the Neolithic revolution". This revolution would have been the beginning of the development of civilizations, i.e. the formation of the hierarchically organized and literate societies (Childe 1936).

In northern Fenno-Scandinavia and Karelia, among hunter-and-fisher societies of the coniferous zone, the introduction of agriculture did not take place in the same manner and pace. Archaeological data indicate that attaining the ability to produce food by new methods did not change the economy of the communities as much as we might assume. Animal husbandry along with the cultivation of land became included in the hunting-and-fishing economy, but the previous ways to earn a living nevertheless remained in a central role. The carrying capacity of the local communities increased, but the number of individuals within a local group or the amount of people in a larger area did not increase. Some cultural and social changes took place, but many features stayed as they were in earlier periods of these societies.

The main aim of my article is to discuss the role of early agriculture in the hunter-fisher populations. The central question is to ponder how and when the adoption of cultivation took place. It is important to discuss the environments in which early cultivation was practised and the kind of technique that was used. For the argumentation, both archaeological and palynological materials are used. They are discussed together with linguistic viewpoints considering loanwords, i.e. vocabulary in connection with the cultivation of land.

A Linguistic Map of Prehistoric Northern Europe.
Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 1–40.

The areas under particular inspection are in the Finnish coastal zone of the Baltic Sea, the Lake District in southern and mid-Finland, and the upper water course of the River Oulujoki in eastern Finland. Neighbouring areas, for example the Karelian district in Russia, are referred to but they are left in a secondary role here. The time period in focus is dictated by the dating of the process of economic change, this is to say the Late Neolithic / Early Metal Period, between ca. 3000 calBC – 300 calAD.

The article begins with the presentation of the traditional archaeological viewpoint on agriculture in the northern coniferous zone. This will then be put together with the methodology and those palynological arguments by the virtue of which the interpretations have been made so far. Certain layers of loanwords bring their own relative chronology and supply the discussion with interesting viewpoints.

The distinction between the two basic techniques, slash-and-burn cultivation and permanent field cultivation, is a point which requires clarification and it will be discussed separately. Social changes depend on the type of cultivation adapted by the local group. It is necessary to consider the effect of agriculture on social systems and networks and how the resulting consequences are reflected at archaeological sites by the coast and inland.

Currently, the key evidence addressing the economic change comes from pollen analyses. Nevertheless, the reflections of the process had been traced in archaeological material already a few decades ago. The change was more or less traceable in linguistic data, too, because a new kind of economy led to the need for new material implements as well as new vocabulary in languages. Loanwords indicate cultural contacts which were essential for the learning of new strategies for subsistence.

Finally, the visibility of an agricultural society is different in archaeological material than that of hunters-fishers. The present discussion attempts to fit all the above-mentioned points of view together and to present a model of how and why the Late Neolithic and Early Metal Age economy – and first of all the cultivation – become visible in light of different materials used in these societies.

2. The spread of agriculture in the light of different sciences

2.1. Archaeologists' views concerning the earliest phase of agriculture in Finland

In this section, the aim of the inspection is to go through the main arguments and conclusions which have been presented concerning early agriculture in Finland. There are four main phases and cultural spheres: The Battle Axe culture, the Kiukainen culture, the Bronze Age in coastal Finland, and the Early Metal Age of the inland. Since the early 20th century, these have all been in an important position in discussions of the early cultivation history of Finland. In addition, even the late Combed Ware is worth discussing.

Archaeologists were the scholars who first raised the question about ancient cultivation in our country. Grindstones were found in prehistoric contexts already at the beginning of the 20th century (Ailio 1909). It became possible to date the early phases of agriculture, but any exact chronology could not be achieved. The first datings were done by shore displacement – the method that was gaining importance in Stone Age archaeology in Finland.

The next step in research history was taken in the 1960s when the 14C method came into use in Finland during the 1960s. In the 1970s, the new essential method for research of early cultivation was pollen analysis. Although geologists had applied the method from the 1890s, it did not have a role in studying early cultivation until the 1970s. It was soon followed by macrofossil analysis (Aalto 1982), which gave archaeologists, geologists, and biologists the ability to take advantage of a previously overlooked group of ecofacts: fossilized seeds and biological remains of all kinds accumulated at dwelling sites by human beings. Paleobiological material considerably sharpened the picture of activities at these prehistoric dwelling sites.

2.1.1. The Battle Axe culture (3200/2900–2300 calBC)

Already Aarne Äyräpää (1939, 120–122) suggested that the Battle Axe culture had pursued agriculture and animal husbandry in Finland. He based this opinion on observations of the local environmental conditions near the known Battle Axe sites, which are not situated near the coast, but instead in regions favourable for animal husbandry. His second argument is that all the sites of the Battle Axe culture were on the warmer (maritime) side of the January isotherm over –8 °C (Äyräpää 1955, 195–96).

In addition, there was a third – and maybe this is the most important – argument: grindstones. At the very beginning of the 20th century this was the find group which included the first archaeological evidence of agriculture in a Stone Age context (Ailio 1909; Äyräpää 1939). A few grindstones were found at dwelling sites, and for a long time grindstones were considered the strongest evidence for crop cultivation by the Battle Axe groups in Finland. Later, this interpretation has met criticism. For example, Torsten Edgren (1970, 55) pointed out that in Finland none of the grindstones had been found in a context, which would make it plausible to connect these artifacts with the Battle Age culture (see below).

In some cases, the human hand may have left traces of cereals on the surface of Corded Ware – the ceramics of the Battle Axe culture. Any incontrovertible evidence of this has not been indicated in Finnish pottery finds so far (Meinander 1954a, 148; Edgren 1970, 55; 1999, 290; Carpelan 1973, 195; 1999, 264). However, it would be sensible to reinvestigate this material, as the number of ceramic sherds has increased and the methodology for the inspection of details on their surface has become more accurate than before.

Over 25 years ago some new evidence was found concerning the hypotheses that agriculture had begun during the Battle Axe phase in Finland. One methodological novelty was pollen analysis. For example, Ari Siiriäinen (1982) dated the appearance of first cultivation to ca. 2500 calBC. This suggestion has proved to be the more acceptable in light of later analyses. Siiriäinen pondered the possibility, however, that the pollens of wheat (*Triticum*) and barley (*Hordeum*) in the sample from Lake Ahvenaisenjärvi (Lammi municipality, Häme district) could be dated even as early as 3500 calBC (Siiriäinen 1982, 216 and 225 Fig. 2). The latter result was based on the pollen diagram of Lake Ahvenaisenjärvi, which was analysed by a biologist Mirjami Tolonen (1978).

Some part of the pollen data were not unambiguous in their dating, but still fit the scanty archaeological data, which also were themselves disputable. Results from different pollen samples varied, but all in all they indicated that the beginning of agriculture had taken place between 2500 – 2300 calBC. In SW Finland, it was possible to suggest this both by the seacoast and in the inland (Huttunen 1982, 211; Aalto 1982, 234).

Professor C. F. Meinander (1954a) saw, in light of ceramic types, that contacts from both the Baltic region and Scandinavia had an important role in the development of the Battle Axe culture in Finland. Christian Carpelan (1982,

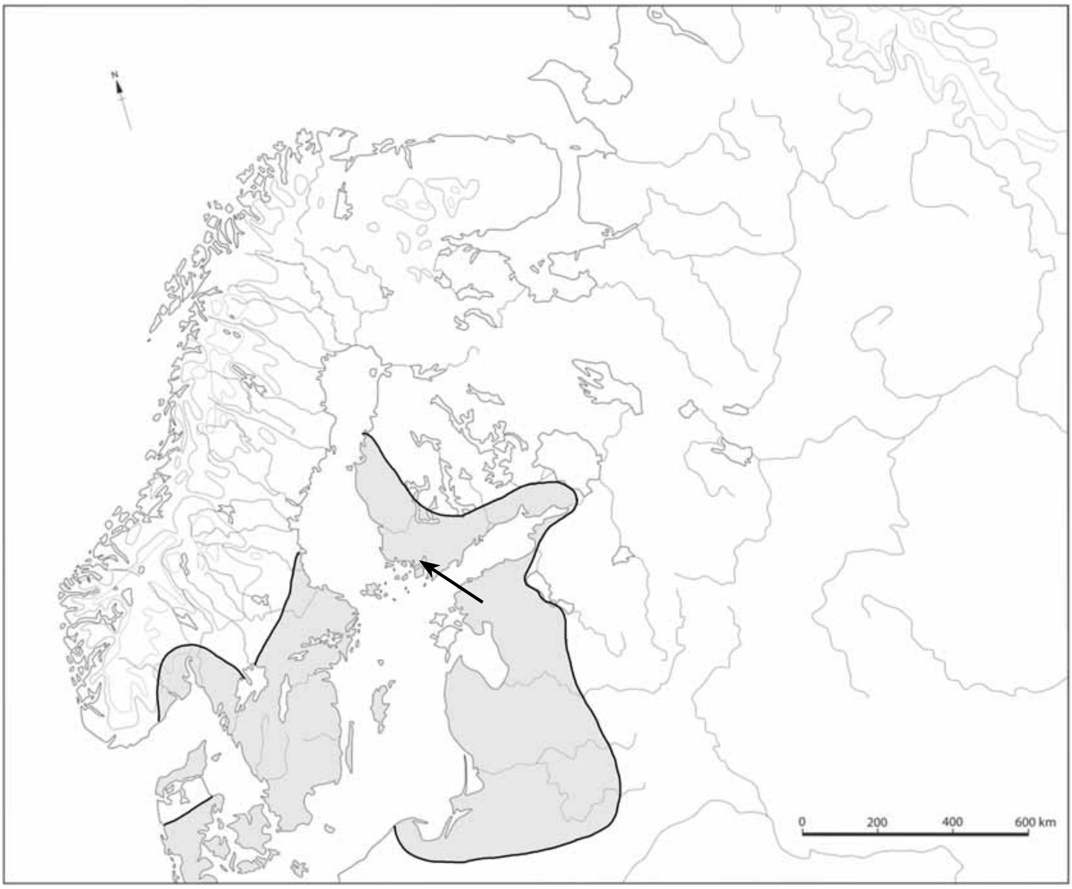


Figure 1. Corded Ware Culture in northern Europe and the possible direction of the influence of it in Finland.

267) considered it possible that the Battle Axe culture and cultivation connected with each other and that they both came from the Baltic region to the northern side of the Gulf of Finland (Fig. 1). In Finland, he scheduled the broad development between the new agricultural population and the indigenous Late Neolithic population which continued hunting and fishing. Carpelan thought that another piece of evidence of the influence from the Baltic region was the so-called "middle zone ceramics" (Sw. *mellanzonskeramik*) which were found in the area from Satakunta district to southeastern Finland, in the inland. "Den representeras närmast av en keramik som inte antyder omedelbara kontakter med Skandinavien men nog med Baltikum" (Carpelan 1979, 14–15). 'It [mellanzonskeramik] is represented most clearly by ceramics which do not point to immediate contacts with Scandinavia, but contacts with the Baltic region can be seen.' (My translation.)

Carpelan (1982) also outlined Bronze Age as an "agricultural society" (my translation, in the original Sw. "*jordbrukssamhälle i Finland*") but in this case he draws a sharp borderline between the population that lived with the help of animal husbandry and cultivation by the coast of the western area. He separates the western Bronze Age – in the same way as it was done since the late 1800s – and the eastern culture, which was probably very different from the western one. Neither pollen analyses nor archaeological facts indicate that cultivation would have belonged to the economy in eastern Finland as early as in the western area. Carpelan (1982, 268) assumed, however, that in the future it might be possible to trace contacts between Bronze Age cultures in Central Russia and eastern Finland. This could prove that agriculture has spread to the latter area from an eastern direction. The most essential note here is that he wanted to separate the western Bronze Age from the eastern culture sphere.

Finnish scholars obtained good material for comparison from observations, which had been made in Battle Axe culture contexts in Sweden and Estonia. In a multidisciplinary seminar about the roots of the Finns in Lammi in 1997, Carpelan stated that "Maatalouteen viittaavat positiiviset indiisiot ovat yhä voimassa myös Suomessa." 'Positive indications of agriculture are still relevant in Finland, too.' (Carpelan 1999, 264, my translation). This probably meant that he considered agriculture in the Battle Axe population in Finland very probable despite the scanty data, which are open to various interpretations. Some scholars doubted this interpretation, because they found the arguments for such early cultivation in Finland to be still missing or inadequate (Edgren 1999, 290). Thus the history of early crop cultivation still needs more evidence in Finland and therefore a compromise has been suggested. Instead of cultivation, it can be considered more probable that a means of livelihood for the population of the Battle Axe culture in Finland was animal husbandry.

The archaeological record includes the bones of sheep, goats, and also cattle. The data are indisputable in character but not very abundant in quantity. It would be easy to direct criticism against the hypotheses considering early animal husbandry and its role in society.

Summing up, the existence of agriculture in Finland during the Late Neolithic has been until now argued for by five main arguments: 1) change in the location of dwelling sites in the landscape, 2) the location of the sites of the Battle

Axe culture, in particular, in relation to climate conditions, 3) bone material as the indication of the emergence of animal husbandry, 4) archaeological material, i.e. grindstones and some other stone implements which may have been used for cultivation work, 5) human influence on the environment.

In the following, I will shortly discuss each argument in different geographical and chronological contexts. The periods under discussion are the Battle Axe culture, the Kiukainen culture, and the Bronze Age. In the inland, I will present the Early Metal Age context and this part of the discussion continues to the beginning of the Iron Age.

Already Äyräpää (1939, 120–122) pointed out that the environmental milieus of the sites of the Battle Axe culture are different from those, which had been favored by Stone Age populations earlier. The sites were not by the coast, though quite close to it. Most important was that they were in areas, which were growing scrubs and they were suitable for meadows. It was reasonable for him to approach the question by the hypothesis that the means of subsistence had changed. Cultivation was not the most likely reason for choosing sites. Another, and at the same time more understandable reason, also for Äyräpää, could have been animal husbandry.

It was Äyräpää (1955, 195–196) who also first paid attention to the distribution of the Battle Axe sites in relation to the –8 C° isotherm of January. Although the argument is controversial it has not been abandoned. Meteorologist Reijo Solantie (1991; 2005) has developed it further. His model is based on the hypothesis that large parts of southwestern Finland were not covered by snow during wintertime in the Neolithic. This made the area favorable for the breeding of swine. Archaeologists have been willing to accept this hypothesis but with the modification that instead of swine, the important domestic animals were either sheep or goats (Salo 2004, 113).

The third argument is based on the bones of sheep/goats, which have been found in excavations. In a few cases, the bones of bovines can be connected with Battle Axe sites, too (Salo 1997, 150–152). These data serve as a hypothetical explanation for the two above-mentioned arguments. In Finland, the osteological material, which would indicate animal husbandry in the Stone Age is still very small in amount (Deckwirth 2008). In neighboring countries, the situation is better preserved and the role of such evidence is indisputable there (Lang 1998, 97–99).

The fourth argument is slender, as actually all the archaeological finds in question are grindstones and most of them come from problematic find contexts. It has not been easy for archaeologists to argue that the other suggested stone implements were really used for cultivation in the past (see below).

The fifth argument concerns the human influence on the environment since the introduction of agriculture. It is reflected in the flora and sometimes we can trace it in the palynological material. Evidence of animal husbandry can be seen in the palaeobotanic material. In a few cases, it corresponds well with the dating and location of the Battle Axe culture in southwestern Finland (Vuorela & Hicks 1996). The relative proportions of herbaceous pollen, i.e. the increase in ancient grazing fields and the decrease of the forest are visible on a local level (Alhonen 1988, 46–47). The possible existence of actual cultivated crops, i.e. *Cerealia* pollen has remained invisible.

Palynology and palaeoclimatology thus together suggest that the Battle Axe populations influenced their environment because of the domestication of cattle. Due to the deteriorating of climate, it was not possible to begin crop cultivation on any large scale. In my opinion, this conclusion is sensible but it cannot be accepted without critical comments.

One more argument has been paid attention by archaeologists. Ella Kivikoski (1961, 68), for example, has pointed out that hunting implements are missing at the dwelling sites of the Battle Axe populations. According to her, the archaeologists should come to the conclusion that hunting and fishing have not been in an important position in the economy of these populations. Kivikoski's brave interpretation urgently requires thorough investigation. It is then necessary to do careful analysis of the find material known from the excavated Battle Axe sites.

It has been recently proposed again that the beginning of slash-and-burn cultivation should be dated already earlier than the appearance of the Battle Axe populations. On the basis of pollen analytical data that were analyzed by Teija Alenius and Teemu Mökkönen (2010, 27) can be argued that this may have happened already by 3800 calBC or at the beginning of the Battle Axe culture at the latest. There is still no firm evidence of cultivation during the Combed Ware. Although the early remains of cultivation are visible in neighbouring countries, this point has continued to remain controversial in Finland.

2.1.2. The Kiukainen culture (2300–1700 calBC)

The very end of the Neolithic Stone Age is described as the so-called Kiukainen culture in southwestern Finland. In this phase, cultivation had already been adopted in the economy of the coastal area. It has generally been accepted by archaeologists and geologists that the earliest slash-and-burn fields in this region belong to this period. According to Unto Salo (2004, 129–131) the number of grindstones has remained very small at the excavated sites and their role as evidence for cultivation during the Late Neolithic has remained problematic. In any case, the strong pollen data (Vuorela 1999) attest to the continuous presence of cultivation in the economy. The importance of the role it played is a point urgently demanding further study.

In addition to grindstones, there is some other archaeological evidence about Stone Age cultivation. A few picks less than 20 cm in length are slender on their edge. For implements, polishing was done only to the edge. According to Salo (2004, 129), axes with thin edges are hoes, which were used for the preparation of small fields. The point is that they are carelessly made and thus they would not have been useful for any other purpose. Some tools were needed for making the slash-and-burn fields and the above-mentioned implements could be used, for example, for this purpose. In my opinion, the role of these implements is without any trustworthy evidence.

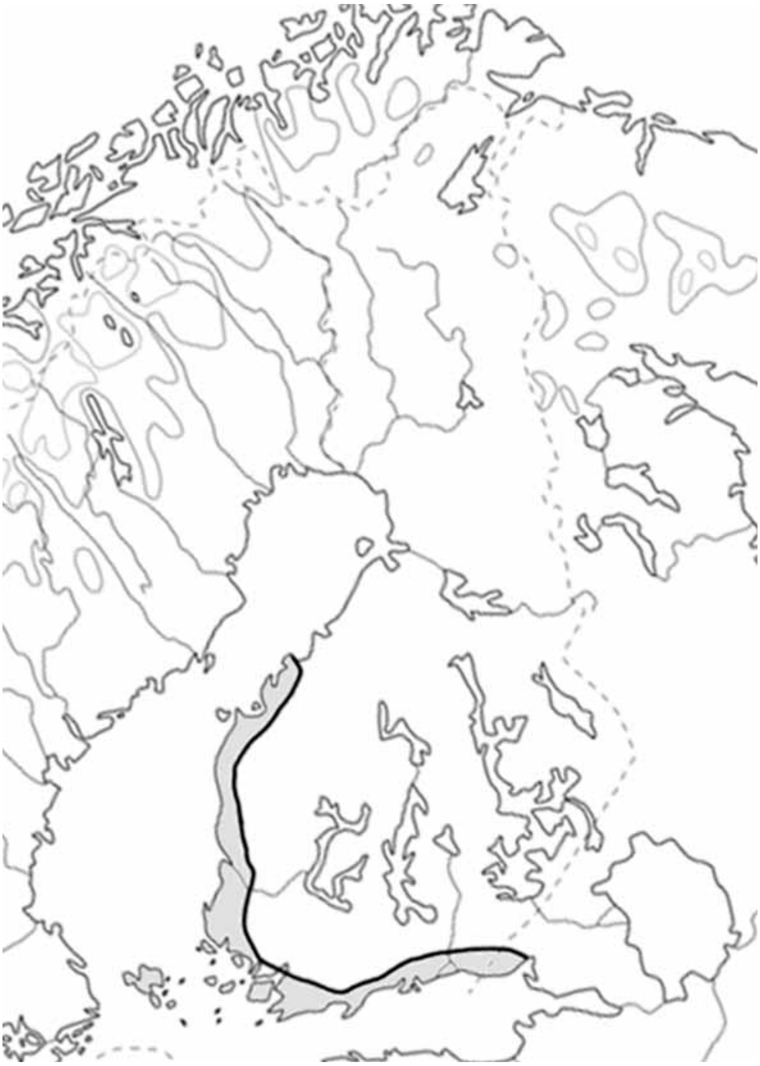


Figure 2. The spatial distribution of Kiukainen culture in Finland.

A find group, which perhaps inspires more confidence as an observation of agriculture, is flint sickles, 20–25 cm in length. They are known only in a small number but they may carry some evidence of agricultural work on their shiny surface. A sickle may have been used for cutting grains but another plausible explanation is also that they were needed for cutting, for example, twists for animals (Huurre 2003). In any case, the use-wear is distinct on the edge of the tools. The sickle finds are concentrated in the coastal zone, in the spreading area of the Kiukainen sites. So, both cultivation and animal husbandry would have been concentrated in the coastal zone.

At the Niuskala dwelling site in Turku, southwestern Finland, some macrofossils of *Cerealia* were found in the late 1980s. This site dates to the transition phase from the Kiukainen tradition to the Bronze Age. One macrofossil grain from the archaeological excavation has been AMS dated. In several layers, there were grains of early species of barley (Vuorela & Lempiäinen 1988). According to contemporary knowledge, barley has been eaten at the site since approximately 2000 calBC (Lempiäinen 1999).

2.1.3. Bronze Age / Early Metal Age

The Bronze Age (on the coast) and the Early Metal Age (in the inland) have been accepted without hesitation as the periods when agriculture began to play an important role in the economy. In the coastal zone, its role has been considered as more evident than inland, however.

It has not been discussed in depth whether cultivation was practised in permanent fields. The question concerning the type of cultivation during the Bronze Age is problematic still today. Salo (2004) assumes that this was the applied technique in the coastal zone. It must be kept in mind that the conclusion Salo suggests about agriculture is not based on clear indication. Any straight support cannot be found in the archaeological material at the sites, however there are indirect data, which speak for this hypothesis.

For Salo, the remains of a house at a dwelling site are often considered as an important indicator of animal husbandry, as the cattle needed a warm shelter in the cold season. Animal husbandry and cultivation are often connected with each other. Such observations can elucidate crop cultivation, as well. In Scandinavia, rectangular dwelling houses and other buildings in the yard have been connected with evidence of permanent habitation and cattle breeding and ploughed fields in a reliable way. Discovery of the corresponding type of sites would also bring satisfactory proof for agricultural economy during the Bronze Age in Finland.

In one single case, such material has already been found. The Rieskaronmäki site in the municipality of Nakkila in Satakunta, southwestern Finland, has for several decades been the key site for interpreting the type of settlement in the coastal zone of Finland in the Bronze Age. The excavation was conducted by Unto Salo in the 1960s and he published the main results in 1981. Several kinds of indicators in the material suggest that this is a starting point for discussion concerning a comparison between the Bronze Age in Scandinavia and on the Finnish coast.

Rieskaronmäki had been close to the Baltic Sea coast in the ancient bay of Panelianlahti. Due to land uplift, the location is by the River Kokemäenjoki now. Finnish archaeologists have for a long time referred to Rieskaronmäki as an important indication of contacts between southern Scandinavia and the areas on the eastern side of the sea by the River Kokemäenjoki water system. This is because Salo has interpreted the most important building remains at the site as evidence of a long rectangular house of the Scandinavian type.

Salo (1981, 391–406; 1984, 157–162) saw that the largest house had been divided into two parts. One end belonged to the family and the other end was for the cattle. There were other remains of other buildings, too. These were of a different shape, not rectangular but round or roundish. According to Salo, Rieskaronmäki was a small village and there were cultivation fields, too, close by the site. His opinions about the economy at this site have had strong influence on how researchers approach the coastal Bronze Age in Finland. Salo has repeatedly (2004, 146) stated that there is no reason to doubt that the livelihood was based on animal husbandry and agriculture, although Rieskaronmäki is exceptional as an archaeological site. Any Early Metal Age sites of this kind have not been found in inland Finland, either. In his excavation, Salo (2004, 146) found bones of sheep/goats but macrofossil analysis did not belong to the methodological toolkit, which would provide direct proof of cultivation.

Coastal area

Already before the excavation in Rieskaronmäki there were suggestions in Finnish literature that remains of excavated dwellings might be interpreted as Bronze Age houses. C. F. Meinander (1950; 1954a, 17–25, 164–165) suggested this for Kaunismäki in Harjavalta by the River Kokemäenjoki and the Böle site in Porvoo by the sea in eastern Uusimaa district by the Gulf of Finland. It remained doubtful whether these observations were possible to connect with Scandinavian long-houses.

The classic views concerning Bronze Age dwellings were based on the circular bottoms known from Otterböte on the island of Kökar in the outer archipelago of the Åland Islands (Meinander 1954b; Gustavsson 1997). These date to the Late Bronze Age like Riskaronmäki in Nakkila. The interpretation was that the huts were seasonally used. The house bottoms at Trofastbacken and Orrmoan in Mustasaari by the southern Ostrobothnian coast close to Vaasa, excavated by Tapio Seger (1986a; 1986b), were circular as well and were built for seasonal visits by Bronze Age hunters and fishers.

At the Borgmästars site in Karjaa in the western Uusimaa region the remains of a rectangular house were dated to the Early Roman Period (Uino 1986, 85–89). The house bottoms more or less resembling those of Scandinavian long-houses are known from the first millennium BC in Finland, though this interpretation is not without its problems. The remains at the Hulkkio site in Kaarina near Turku, SW Finland and the above-mentioned Böle site in Porvoo in Uusimaa (see Strandberg 1996; 2002) have been suggested as being rectangular in form. The house remains at Ketohaka in Salo on the southern coast of Finland (Uino 1986, 85–89) were difficult to discern but they may date to a later period, i.e. to the Early Iron Age.

Conclusions can be made that although a few house remains of approximately the same age have been discovered in Finland, these do not fit the Scandinavian Bronze Age tradition – with one exception, the Rieskaronmäki house (see Asplund 2008, 263–272). Any straight evidence of cattle breeding is not known from most of the sites, however the cases are very different in character.

The most obvious reason for the lack of a satisfactory solution in determining whether agriculture was present in Finland during the Bronze Age is that there are very few known Bronze Age dwelling sites (Meinander 1954a;

Salo 1962; 1976; 1981; Salo & Lahtiperä 1981; Strandberg 1996; 2002; Asplund 2008). Another striking paradox is the conspicuous difference between the number of Bronze Age / Early Metal Age burial cairns and settlement sites from the period. The number of cairns exceeds surely 10 000 (Salo *et al.* 1992) but the traces of Bronze Age dwelling sites is not bigger than around 50. Understandably, the settlement history of the Bronze Age populations is still waiting for new evidence before it can be described in more detail.

Inland

In the inland, the number of known Early Metal Age settlement sites is considerably larger, evidently more than 200. Bone material indicating cattle breeding has remained restricted as well. Comparing all the research of crop cultivation on the one hand and hunting and fishing on the other, the investigation of the role of animal husbandry in the inland during the Early Metal Age has remained deficient. The insufficient material does not offer any clear or trouble-free indications of this part of the economy.

Though animal husbandry had begun to be in use and the most common domesticated species were sheep or goats, the archaeological contexts are incoherent. For example, at the dwelling site complex of Vaateranta in Taipalsaari, Southern Karelia, there were bones of cattle, which may date to the Late Stone Age (Räty 1995). In this respect the site is exceptional, as almost across all of eastern Finland and Ostrobothnia, bone material is missing until the beginning of the Iron Age or is ambiguous in quality. The contexts at Vaateranta site are problematic, however, and the question remains open whether the bones date to the Stone Age.

As already mentioned above, any remains of rectangular Early Metal Age houses have not yet known by now in the inland. There are bone finds from Vaateranta, however, and in the light of macrofossils, the observations of agriculture are remarkably more numerous than those indicating animal husbandry. In addition, we know that barley belonged to the nutriment of at least one group in the inland. The grains were analyzed at the Kitulansuo site in Ristiina (see below) in the Lake Saimaa basin (Lavento 2001, 142).

After the first experiments in the Late Neolithic, it took a long time both in the coast and inland before any considerable amount of places were taken into cultivation by prehistoric dwellers. A few areas of the early trials soon remained without human impact and they were returned again later.

According to the preliminary results of recent analyses, the beginning of agriculture did not take place at the same pace everywhere. On the contrary, pollen data from several areas in Finland show that this adaptation required a long time to take root during the Late Neolithic and Bronze Age / Early Metal Period. The tradition never completely broke down during any particular period though the development of animal husbandry and cultivation to a central role in the economy was slow (Huurre 2003). On the local level breaks may have occurred, but at the same time agriculture continued somewhere else.

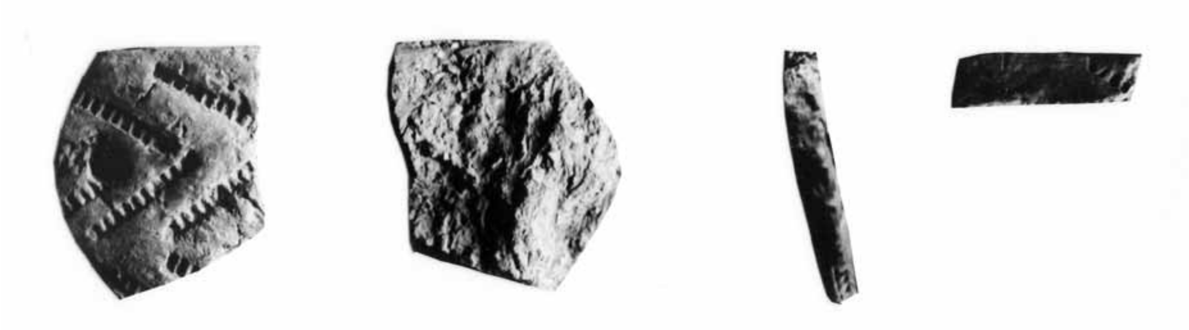


Figure 3. Textile ceramics found at the dwelling site of Kitulansuo d in Ristiina. Photo: M. Lavento.

2.2. Pollen analyses in the research of environmental change

Pollen data show that the oldest evidence of agriculture in inland Finland dates from ca. 2300 calBC. This dating has been settled as a result of many pollen analyses made during the last four decades, as well as, contemporary datings of recent analyses (Vuorela 1999; Alenius 2007; Alenius *et al.* 2009). The appearance of the first *Cerealia* in pollen profiles does not indicate that cultivation of crops necessarily took place in fields, but instead only points to the presence of *Cerealia* in the pollen at the particular location of the sample. It addresses the cultivation in various environments and under different conditions – seeking to determine which areas were treated as suitable places for cultivation and which were the places of only sporadic attempts at cultivation. Approached from the viewpoint of agriculture today, it often seems that the areas of early cultivation had not been practical for permanent farming.

A considerable difficulty in the interpretation of pollen profiles is that often only a single pollen grain has been found in samples dating from the earliest periods. A single sporadic trace of *Cerealia* pollen is always interesting but understanding its role and explaining the human influence requires further data. These data indicate the human influence in the environment, the bog or lake where the sample has been taken. In practice, the influence is visible in the decrease or increase of virgin forest tree species, wild herbs, and certain other natural plants.

However, the human Stone Age activity can be traced without any observations of *Cerealia* as well (Vuorela 1994; Vuorela & Kankainen 1996; Koivula *et al.* 1994). In such cases, however, the cultivation of crops cannot be proved directly. An important reason why Late Stone Age communities influenced their environment was animal husbandry, i.e. grazing and collecting the nutrition for animals. Other possible reasons, such as promoting some plants specifically for human use will be discussed below.

Pollen profiles can tell how actively, in what way, and for how long in time the area has been utilized in the past. The information value of samples varies in each case, because sometimes it is possible to combine them with archaeological data, i.e. the age and character of a nearby site. Still, in many cases the results are rewarding and they open possibilities for building models about the meaning of the close environment to the ancient dwellers there. Sometimes traces of cultivation are sporadic not only from Stone Age but from other prehistoric periods, too.

In Finland a considerable part of the Late Neolithic / Early Metal Age sites are found in forests or in areas covered by forests in the past. In the history of such environments the change in the percentage of pollen from trees is the first clear indicator that development has begun to proceed in a different way relative to the natural development in the past.

Arboreal pollen (AP) of *Picea*, *Pinus*, *Betula*, and *Alnus* are the most typical in the Finnish forest. Non-arboreal pollen (NAP) and pollen of broad-leaved trees (QM) come from *Corylus*, *Ulmus*, *Quercus*, *Tilia*, *Carpinus*, *Fraxinus*, and *Fagus*. Together the AP, NAP, and QM tell the total sum of terrestrial pollen grains and the share of the forest in relation to all pollen remains can be calculated. Change in their relative proportion in the local vegetation addresses long-term changes in climate. *Juniperus* (Fi. *kataja*) pollen values are followed in the diagrams. This is because the human impact on the trees has resulted in an increase of juniper close to dwelling sites.

Variations in the percentage of tree species cast light on the climate history on a local level. Such changes may show that trees have been cut by man, and accordingly the relative share of grasses has increased in open areas. The first appearance and increase in the amount of *Picea* are an interesting general benchmark at all the sites where pollen analyses have been done in Finland. It identifies the point in time when this species “arrived” at the area in question from east to west. This change was independent of human populations as such, but still it is an important phenomenon from the cultural point of view, as environmental conditions directed in what kind of place cultivation could be started.

The increase of *Poaceae* (or *Graminae* group) includes large number of flowering plants (Fi. *heinäkasvit*) and *Urtica* (nettle, Fi. *nokkonen*) as well as the often just sporadic evidence of *Plantago lanceolata* (ribwort plantain, Fi. *heinäratamo*) and *Plantago minor / major* (greater plantain, Fi. *ratamokasvit*) are usually of particular importance in the pollen record. These species include several different plants including common weeds in human-influenced environments and they are often considered as indirect indicators of grazing, too. Their existence refers to human influence. In the coniferous zone they often emerge in pollen diagrams close to Neolithic sites. These sites belonged to hunting-and-fishing communities but the particular value of the pollen information is that they involve faint evidence of either pastoral or cultivated lands. Some of them also have had value as a medicine.

Urtica (nettle) grows at refuse heaps, which are caused by human culture. Although often overlooked today, the plant has several good characteristics and it was utilised by people from early times. It is nutritive and medicinal but first of all it has good fibrous qualities and it was handy to make nettle nets and ropes. It is reasonable to assume that conditions, which propagate the growth of the nettle had been actively formed by people already in the Late Stone Age.

Plantago lanceolata / minor / major (see above) and *Cannabis* (hemp) were useful plants already in the Stone Age. They are practical as medicine and suitable for making resin or oil. Their function as drugs has been known for a long time. Hemp textiles and ropes are in use even today. Both plants can be used as nutrition by cattle as well as humans.

The *Ranunculaceae* family (Fi. *leinikkikasvit*) consists of different plants, which are divided into the buttercup family and the crowfoot family. Usually, single species cannot be separated in pollen analyses. Despite this, the presence of the family in the pollen record tells us that forest, be it coniferous or deciduous, had vanished or the number of trees has diminished and the environment was mostly open. For the cultural study, this not too detailed information is interesting because it, in any case, indicates the change and probable influence of human activity in the area. The species of the *Cichoriaceae* family (Fi. *sikurikasvit*) are complicated to separate as well, but some of them are frequently recorded in pollen profiles near archaeological sites. The observation refers to influence from outside in a virgin forest.

The *Brassicaceae* (*Cruciferae*) (Fi. *ristikukkaiskasvit*) family includes a few flowering plants. They are all indicators of an open environment, not the forest, and they have likely been propagated by man. Some of the species are food plants, for example cabbage and turnips (Fi. *kaali*, *nauris*). The latter may have grown on the slash-and-burn fields. An interesting plant is woad (*Isatis tinctoria*, Fi. *morsinko*) because it was used for producing blue color; even more important was that it had a great value for medical purposes. In Finland, it grows in the southern part of the country. In some cases macrofossils, too, indicate its occurrence in the Stone Age context.

Sampling sites

In the Finnish research, most archaeological pollen samples have been taken from the area close to the dwelling sites. There are several exceptions from this starting point, which will be discussed later. The hypothesis implies that agriculture could be found close to concentrations of either synchronous or multi-period sites. A logical consequence of it would then be that the places for agriculture were not far from the dwelling sites. Settlers of sites burned the forest away first of all for themselves but also in order to widening open area for grazing and cultivation. All these activities influenced the flora and this can be recorded in the pollen sediments. The intention to connect settlement and cultivation has guided researchers to choose the sampling locations by following this principle and the reflected results. Pollen analyses seem to provide valuable knowledge of how sites and environments were used.

Cultivation in permanent fields took place near permanent settlement sites, i.e. houses and villages. On the basis of pollen analysis alone it is difficult to tell when this kind of agriculture had begun. On the southwestern coast of Finland, the most probable period for the increase in cultivation was the later Bronze Age. According to Irmeli Vuorela (1999), the most plausible date could be the Early Iron Age. From that time the tradition spread to Satakunta, Häme, and Karelia.

In eastern and northern areas of present-day Finland and even in the northern parts of ceded Karelia the cultivation practices were different. Slash-and-burn may have been the only way of cultivation for a long period of time. It is worth noting that Bronze Age and Iron Age farmers often had slash-and-burn fields along with more permanent areas for cultivation.

For the research of field cultivation it is sensible to take pollen samples from the close neighborhood of dwelling sites. In cases where we look for evidence of slash-and-burn cultivation this is not the most typical situation (Engelmark 1995). There may not be any settlement remains in close proximity of places for occasional cultivation. Sites have been in use for short periods only because the maximum time for the utilization of land for agriculture was limited. For example, in a forest where the soil is gravel or the bedrock is close to the surface, it is possible to receive one or two good harvests but not more. Such a place must be left for 20–30 years until it regains its fertility and can be brought into use again. This type of cultivation played a major role in prehistoric northern Fennoscandia and the coniferous zone of Russia from the Late Neolithic to historic time (Orman 1995; Aalto 2006; Vuorela 1999). Unfortunately, many potential areas are still out of the scope of investigations, because pollen samples have usually been taken near known archaeological sites.

The territorial representativeness of pollen samples is a noteworthy deficiency in the current research but not the only one. Another difficulty lies in the dating of samples dated by the conventional 14C method during three decades leading up to the end of the 1990s. AMS-dating (Accelerator Mass Spectrometry) has become the common method for the dating of pollen samples in Finland since the late 1990s. A considerably larger amount of material is required for a conventional dating than in the case of AMS. For sampling 5 g of charcoal are required. It takes several hundred years for such a layer of turf to accumulate. As a consequence the accuracy of a conventional 14C dating can be poor, i.e. a standard deviation of over one hundred years in both directions from the ”correct” date is not unusual. Along with the AMS method this problem has often been solved but comparison with previous and methodologically different analyses is problematic.

The palaeomagnetic dating of the sediment is new and often an accurate method (Ojala & Alenius 2005). In the case the material has accumulated in the water bottom without disturbance, the layers can be dated to the accuracy of ±50 years, however the accuracy can be as good as ±30 years (Saarinen 2000). This method is based on measuring the declination, inclination, and intensity of the particles in different layers.

Despite the considerable number of pollen analyses from Finnish sites it is not always easy to get access to the results. Many pollen analyses have remained unpublished. In some cases the main result, i.e. the (approximate) dating of the first phase of cultivation can be found in literature but the environmental history of the sampling site is not described and the later history of cultivation is not discussed (Grönlund *et al.* 1990; Simola *et al.* 1995). In practice, there is a lot of "silent" knowledge among the pollen specialists, but it is not available officially.

The history of cultivation in Finland is known quite well since the Bronze Age but many issues of the late Stone Age have remained problematic. For instance, we know that there are ca. 20 locations where pollen indicates early cultivation in the 2nd millennium BC. More accurate dates for the beginning of earlier cultivation should be determined at new locations and in each case the land use in later times should be better clarified. Last but not least, an open question pertains to the Karelian Isthmus and Karelia around Lake Ladoga. For some reason, the analyses so far show that the beginning of cultivation would date to the early Iron Age, only during the first century AD. But the corresponding Finnish material clearly attests to the beginning of the sporadic agricultural land use already during the Early Metal Age.

2.3. Macrofossils – grains of four crop species from the early phase of agriculture

In light of the Finnish material, it is difficult to determine the importance of the role the earliest cultivation played for local populations. The pollen evidence shows only that some agriculture certainly has been practised since the final phase of the Neolithic and during the entire Bronze Age and Early Metal Age (Grönlund *et al.* 1990; Vuorela 1982, 265; Vuorela & Hicks 1996; Vuorela 1999).

After adopting pollen analysis as a central natural scientific method of archaeology, the even more local and useful method, macrofossil analysis, came into archaeology in the 1980s. Macrofossils are a greater indicator of agriculture than pollen analysis, because the material and results are wholly connected with dwelling sites. They give concrete proof as to which types of grains or parts of vegetables were used at dwelling sites. Thus far, however, this kind of evidence is scanty from the earliest phase of cultivation in Finland. The practical problem is that the research material connecting to the Late Neolithic, Bronze Age, and Early Metal Age sites is not rich and as already stated earlier, the excavation methodology has not been exact enough for collecting the material in the excavations carried out before the 1990s. Some material does exist and the outlines of the ecology at the sites can be presented.

In Finland, the oldest known grain of barley found thus far is at the Niuskala dwelling site in Turku. This site is located on a low hill, which was located just by the sea during the late Neolithic Kiukainen phase (Lempiäinen 1999, 153) (see below). The dating 3800 ± 100 BP as calibrated is 1690–1260 calBC (Asplund 2008, 292) and it indicates that the earliest cultivation may have happened in the southwest part of the country already at the turn of the Stone Age and Bronze Age. In the inland, macrofossils of crops are usually scanty in the soil samples of the period preceding the Iron Age. Nevertheless, it seems possible that cultivation has been a part of life already in the early Metal Age. At the Kitulansuo d dwelling site in Ristiina, Southern Savo district, a grain of barley was dated to 1400–1020 calBC (Lavento 2001, 139) (see below).

From the late Bronze Age, there are two AMS-dated grains in the Finnish material. The grain from the Luistari dwelling site in Eura, Satakunta, is from 2560±55 BP (780–562 calBC) (Lehtosalo-Hilander 1999, 42). The calibration is in this case somewhat problematic, as the dating result fits the phase where the calibration curve rises up to twice inside the 1 σ probability value. Accordingly, the result falls between 830–510 calBC and 470–410 calBC (Asplund 2008, 298).

In southern Ostrobothnia, a grain was dated from a sample taken by Peter Holmblad (2007, 153) in his excavations of an ancient cultivation site at the Peltomaa site complex in Alatalo in Laihia municipality just recently. The calibrated date is 830–550 calBC on the 2 σ confidence level. In the case of Peltomaa, it is very interesting that in addition to barley, several grains of oats were found, too. The sampling context was not unproblematic but the result may actually represent a later phase of use in the same field, as the area had also been used actively later on. According to Holmblad it is possible that permanent and manure cultivation already began at the site during the later part of the Bronze Age. Interesting results also have been found at other dwelling sites.

So far this is almost all the macrofossil evidence for crop cultivation from the Bronze Age in Finland. As far as the Pre-Roman Iron Age is considered there are dated grains from the Hannunniittu dwelling site in Turku (Häkkinen & Lempiäinen 1996) and from Huilu 2 in Lappi municipality, Satakunta (Raike & Haimila 2003, 18).

It has usually been assumed that the cultivation of rye did not begin before the Iron Age in Finland. However, recently this crop species was found in an Early Bronze Age context in the inner archipelago by the southern coast of Finland. At Lake Söderbyträsket in Dragsfjärd on the large island of Kemiönsaari, there was both barley and rye in a context dating to 2200–2030 calBC (Alenius 2008, 576; Asplund 2008, 298). According to present knowledge, such an early dating of rye is exceptional. On the same island, several samples from five different sites indicate many short periods of crop cultivation during the long period of settlement from ca. 2100 calBC up to the Viking Age. According to Alenius (2008, 581–582) and the viewpoint presented based on pollen evidence, there has been continuous settlement almost without any breaks from the late Neolithic to the present day.

Wheat emerges first in the Pre-Roman Iron Age in the Finnish material. The earliest evidence is from the dwelling site complex around the Rapola hill fort in Häme, which has been one of the most important settlement concentrations in the inland from the Pre-Roman Iron Age until the historical period (Vikkula *et al.* 1994, 52–54). Despite its emergence already in Iron Age contexts, wheat did not achieve any important role in Finland before the late Iron Age. Particularly in the inland, there were rye and oats, which had an essential role in cultivation.

2.4. Linguistic support for the dating of the earliest agriculture

Linguistic material is of central importance for understanding change in societies and their economy. Cooperation between linguists and archaeologists has been useful in researching early agriculture in Finland.

Any absolute chronology cannot be constructed for either loanwords or toponyms, but the relative chronologies of these two categories are available (Kallio 2006). It is important to note that the Late Neolithic and Bronze Age / Early Metal Age are considered here as the periods during which certain characteristics emerged in the languages spoken within the research area. In the following section, I will highlight a few examples of vocabulary, which are connected with cultivation. Though toponyms might bring many interesting insights, they are not discussed much in this work.

The important loanwords which were needed by the groups adopting cultivation practices are Fi. *ohra* 'barley' (*Hordeum*), *ruis* 'rye' (*Secale*), and perhaps also *vehnä* 'wheat' (*Triticum*). According to contemporary palaeobiological data, the oldest cultivated crops were barley and rye, and thus the linguistic dates of these two words are of special interest here.

The etymology of *ohra* is connected with the meaning 'sharp issue', i.e. with a shape like a barley seed. The word may have existed already in Indo-Aryan but the more probable dating is the Baltic layer of loan words in Finnish (Häkkinen & Lempiäinen 1996; Häkkinen 1999, 170). The etymology of *ruis* is probable Germanic. Fi. *kaura* 'oat' belongs to the same chronological layer of loan words (Häkkinen 1999, 170–171).

The name of the fourth important crop species *vehnä* refers to the Volga-Finnic context. In Finnish, the same crop was also referred to by the synomym *nisu*, but today the word is used in dialects or for a specific nuance only. The distribution of *nisu* 'wheat' is from Finnish in the north to the Baltic languages. However, it is almost extinct over large parts of this region (Häkkinen 1999, 170).

The Finnish word for the open area used for slash-and-burn cultivation is *kaski* and the verb *kasketa* means 'to prepare *kaski* in a forest'. The attribute *hu(u)hta* refers to spruce forest in particular, hence *hu(u)htakaski* 'area for slash-and-burn cultivation in a spruce forest' (Sarmela 1995). The word *kaski* or (Gen) *kaske* is a very early loanword, possibly of Indo-European origin (Koivulehto 1988, 289–290). Archaeological material supports the dating.

April was the month when trees, the spruce in particular, should be felled in the forest in order to allow them to dry over the summer and (usually) the next winter (Tvegsberg 1995, 109). This knowledge is kept in mind by the speakers of modern Finnish, although in an implicit way: the word for April is *huhtikuu* (*huhti* < *huhta* + *kuu* 'month'). Jorma Koivulehto (1985) suggested that *huhta* could be of Baltic origin in Finnish, but more recently (1999, 225–229) he has also considered the possibility of it being an Iranian loan.

Based on cultural context, Fi. *pelto* : *pello-*, 'field for cultivation' is assumed to be newer than *kaski* and *hu(u)hta* and the linguistic characteristics of the word suggests the same. According Jorma Koivulehto, *pelto* belongs to the Germanic layer of loans or it may be of Pre-Germanic origin in Finnish. In the latter case, the cultural contacts would date to ca. 1000 BC (Koivulehto 1984, 198). All scholars, archaeologists, biologists, and linguists alike agree that cultivation was first adopted in the form of slash-and-burn in the territory of the present-day Finland.

Other valuable linguistic traces of early agriculture and the change of society in this phase are *jyvä* 'corn', *jauhaa* 'to grind', *siemen* 'seed', *kylvää* 'to sow', and *kyntää* 'to plough'. The oldest of these may be *jyvä*, which according to certain opinions is dated to the Neolithic Stone Age (Joki 1973; see also Koivulehto 1984, 195).

The word *siemen* is most probably a Baltic loan word (Thomsen 1890), while a Germanic origin has been suggested for *kylvää* (Koivulehto 1984, 194–195). One important, but also complicated, word is *kyntää* : *kynnä-*, which may derive from *kynsi* : *kynne-* : *kynte-* 'nail' (see Vilkuna 1971, 20–22). The Finnish word for (homebrewed) beer *kalja* may also date to the same phase of loans, as recently suggested by Petri Kallio (1998).

As far as the up-to-date archaeological data are considered, all the above-mentioned concepts were necessary for communication in the Late Stone Age and Bronze Age / Early Metal Age if cultivation of any kind was practised. Nevertheless, the words for slash-and-burn, *kaski* and *huuhta*, are older. These give us the general picture of what was the most important type of cultivation in Finland through these periods and even up to fairly recent times.

I have discussed above the relative chronology of words only. Previously it has been discussed which of those words have become generally accepted as "old words" and which can be connected with the oldest cultivation. However, the etymologies and chronology raise different opinions and these issues have yielded a large number of articles. Reconstructing any absolute chronology is anything but easy and it is reasonable to make with the help of interdisciplinary methodology. In his excellent article about the absolute chronology of the Finnic languages, Petri Kallio (2006) shed light on the methodological and chronological difficulties of dating on an etymological basis. He indicates that the absolute chronology of these words varies very much. From the perspective of the archaeologist, it is evident that numerous linguistic arguments are sensible and plausible and the possibilities to date words with the aid of various arguments seems promising, though it depends a great deal on the researcher and his/her viewpoints.

In the following two chapters, I will discuss how the different categories of available data, archaeological, palaeobiological, and linguistic, could be combined together. The palynological and archaeological dating of the earliest phase of cultivation, i.e. the Late Stone Age ca. 2300 BC, fit more or less together. The Battle Axe culture raises discussion in this respect, because it could be a strong candidate for explaining from which the direction the innovation spread on the coast of Finland. The problem is, however, the small amount of evidence.

Nevertheless, it is reasonable to accept the hypothesis that cultivation began on a larger scale during the Late Neolithic – this is to say during the early Kiukainen culture at the latest. The development during the Bronze Age / Early Metal Age must be discussed in light of all possible evidence because archaeological material alone is too scanty for this ambitious task.

3. Evidence of early agriculture in Finland – slash-and-burn cultivation or permanent fields?

3.1. Discussion in the 1980s in Finland

The search for evidence of early agriculture began with the question of where and how prehistoric groups could have practised cultivation of crops and other useful plants. It seems that scholars were willing to find signs of agriculture of any kind. However the most probable evidence might have been found in searching for signs of slash-and-burn cultivation in southwestern Finland. Today scholars might also expect to find signs of ploughed fields but the emergence of these would have taken place later. However, it was essential and wise that sampling was done in most parts of the country. The general picture of the history of cultivation in Finland has been relatively evenly outlined although it is always important to take into account the amount of samples and the preciseness of each analysis (Vuorela 1999, 145–149).

It is not easy to trace field cultivation in the empiric material. First, in the sediment profiles the early evidence of pollen tends to be scanty and the distribution of pollen is inhomogeneous. This often leads to the conclusion that there was not any continuation of cultivation in the past. Second, thus far the archaeological observations of ploughed fields are very few in Finland. In the pollen profiles, separating these from the effectively used slash-and-burn field is also not without problems.

Kimmo Tolonen's (1982, 323) interpretation of his pollen samples from the Häme region was that continuous cultivation began there already during the Early Bronze Age, during the second millennium BC. After a break between ca. 800–600 BC, the cultivation of barley continued and rye was introduced, too. Since 600 BC, agriculture has been practised until the present day. Pollen analyses in other parts of Finland have indicated a long prehistory of cultivation since the Late Neolithic and Bronze Age / Early Metal Age (Vuorela 1999, 145–146; Alenius 2008, 579–582).

It seems that during the early phases of the introduction of pollen analysis in the research of cultivation, interpretations were optimistic towards field cultivation. Scholars understandably thought that areas by the coast had been the most suitable for a cropping system with rotation. The differences within the country then became clearly visible. In the southwestern part of the country, cultivation was easier and it was possible to use ploughs in the fields (Orrman 1991). Despite this, the analyzed early pollen profiles did not normally indicate the continuous pollen sequence reaching from the Late Neolithic to the Late Iron Age.

Irmeli Vuorela thought in the early 1980s that Bronze Age cultivation could not have been the "most primitive" because the pollen of the Swedish turnip (*Brassica napus subsp. Napus*) and turnip (*Brassica rapa var. Rapa*) were found. Her interpretation was that early cultivation already had been practised in ploughed fields in southwestern Finland (Vuorela 1982, 255). Today, when more data are available, they do not necessarily support Vuorela's idea that the settlement structure was stable yet.

In the 1980s the general view was that field cultivation may have been practised on the coastal zone of southern Finland and the archipelago of Åboland perhaps already in the Kiukainen culture and during the Bronze Age, in particular. The transition from fishing and hunting towards a mixed economy was most apparent on the coast among the groups, which also had adopted the first bronze implements in this region. In other areas the cultivation in question instead had been experiments. Archaeologist Christian Carpelan (1982, 275) applied the term Sw. *gård* 'farm' and pointed to the possibility that on the coast the households had animal husbandry, cultivation on both slash-and-burn fields and ploughed fields, along with fishing and hunting as a means of subsistence.

3.2. Current research of early slash-and-burn cultivation

At this point it has already been very well attested with the help of the palaeobotanical data that agriculture has been carried out in large parts of the present-day territory of Finland since the late Neolithic. The pollen diagrams indicate, however, that in most cases cultivation has been very sporadic (Vuorela 1999; see also Suomen historian kartasto (Vuorela 2007)).

The prevailing hypothesis is that hunters-fishers tried to introduce agriculture but they failed due to the climate deterioration, which began already during the Late Neolithic. Due to the harsher environmental conditions, the size of the population decreased – despite trials to support the economy by new innovations. This is evident in the number of Early Metal Age sites which are, in fact, less numerous than the known sites from the Late Stone Age phase. Already Julius Ailio (1909) wrote that changes in the settlement pattern were due to climatic reasons.

The settlement continued on the coastal zone in southwestern Finland and Lapland. Habitation did not disappear in inland Finland, either, but the character of sites became different. Stone Age ceramic types were replaced by Textile pottery. Bronze came into use and agriculture was practised along with the traditional means of livelihood already since 2300 calBC. In comparison to the large Stone Age sites, sites during this period become considerably smaller. The data are based on the research done in Finland since the 1970s by the Geological Survey of Finland, the Karelian Research centre, and various universities.

In eastern Finland, some Stone Age groups may have diminished considerably or even disappeared in some areas and new groups arrived (Lavento 2001).

In any case, communities became more mobile than before (Lavento 2005). On the other hand, most of the Early Metal Age sites are located in the same type of environment as during the Stone Age, i.e. on the shores of lakes and rivers. In surveys, the sites are easy to find but sometimes they are hard to date. In many areas, we can distinguish between Stone Age and Early Metal Age habitation by the aid of shore displacement chronology. But in the supra-aquatic regions this does not work out, of course. Further we note that in a few cases there are layers from different periods on the same site and the material is mixed.

The model suggested before does not fit in the inland of southern Finland. Usually, there is not any continuation from the Stone Age to the Early Metal Age in these sites. The Kiukainen population and the Bronze Age groups may have lived simultaneously in the coastal zone for some centuries. The economy of the Kiukainen population was based on grazing and restricted cultivation along with hunting and fishing in the same way as in the region of Lake Mälar, Sweden at that time (Jensen 1989). The Bronze Age population may have favored grazing and cultivation. Gradually, the Kiukainen groups were replaced by the Bronze Age population or were assimilated into it. Unto Salo (2004, 140–148) has dated the replacement of the Kiukainen sites by the southern Scandinavian type of settlement to ca. 1200 calBC.

Populations have always been able to search for the optimal means of subsistence in different conditions. The last half of the millennium BC and the beginning of Common Era were the coolest times in Finnish prehistory since the arrival of the pioneer settlement ca. 10 000 years ago. Nevertheless, recent palynological analyses indicate that slash-and-burn cultivation continued in some places in the inland (Alenius *et al.* 2009). These locations are unsuitable for farming today but in the Early Iron Age they may have been even favorable for small-scale, though sporadic, agriculture.

In the Repovesi national park in the municipality of Valkeala, southeastern Finland (Alenius et al. 2009), the pollen analysis shows that cultivation was practised in the near vicinity of the small lake. Areas of potential agricultural land are scarce and small, though. The landscape is characterized by steep slopes, deep lakes, and large cliffs (Fig. 4). A likely hypothesis is that the cliffs saved the warmth of the sunshine and this reduced the risk of night-frost. Slash-and-burn cultivation has been carried out on similar sites in historical times, too (Talve 1979; Vilkuna 1977).

The dominating tree species by Lake Repovesi species is spruce. Thus the most probable slash-and-burn method has been Fi. *huuhtakaski* in the spruce forest. After burning, the field was fertile during three seasons (see Orrman 1995, 98–99). After this it had to be abandoned for rotation or it was used for grazing. Thus one group of people needed several fields of the *huuhta* type, and in principle these could be found in archaeological surveys. So far there are very few such observations, though. In the future, we should pay more attention to areas, which are traditionally overlooked by archaeologists who search for Stone Age settlement in lake areas.

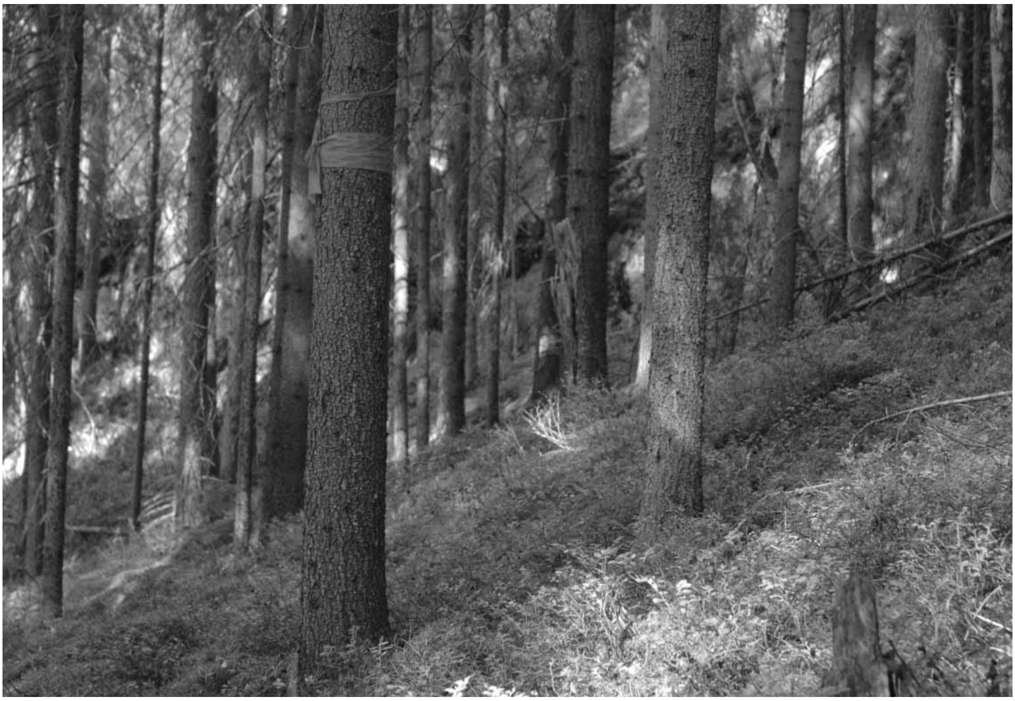


Figure 4. Slash-and-burn cultivation forest in Repovesi, Valkeala.
Photo: M. Lavento.

3.3. Evidence of field cultivation and interpretations

It is a complex question how to date the beginning of year-from-year cultivation in ploughed fields. In the coastal zone, agricultural fields belong to the way of life since the Bronze Age. Unto Salo (2004, 146) does not doubt that the dwellers of the Rieskaronmäki site in Nakkila were farmers. In the Bronze Age there was new population that occupied coastal areas. Salo discusses the question about ownership on the basis of linguistic facts and according to him the occupiers of the land were Germans who brought a few loanwords connected with agriculture to the Early Finnic language (Salo 2004, 140–148; Koivulehto 1987, 33–36). These people were used to living in permanent houses instead of huts and they were familiar with animal husbandry and cultivation. The exact type of agriculture they practised is unknown, but the impression is that there were grazing lands not very far away from the dwelling houses.

Further, in the inland in the Kokemäenjoki river basin the Sarsa ceramics indicate habitation, which professor C. F. Meinander (1983) connected with the introduction of field cultivation. Christian Carpelan continued the same line of argumentation and suggested that there had been a so-called Middle-zone group in the Häme region (Carpelan 1978; 1982). Salo (2004, 148) points to the lack of adequate research in the region in question (Sastamala). He does not believe that hunting and fishing sites could have been suitable for cultivation at all. His argumentation begins from the hypothesis that the way of life of farmers required a house with a cowshed (Salo 2004, 140–148). However, he assumes that in the Sastamala region farmhouses may have been similar to those near the sea coast.

Carpelan thinks that since the agrarian-pastoral and hunting-fishing were two different socio-economic systems during this period it is reasonable to consider agriculture as a decisive factor, which separated populations from each other. In other words, crop cultivation is an aspect of ethnic identity (Carpelan 2006, 79; Carpelan & Parpola 2001, 68). There was a border between the coastal zone of southern Finland and the inland. It existed for ca. 2500 years, until the Merovingian period (beginning of the 7th century AD).

Salo (2008) shares the same view. With a reference to Meinander (1983) he considers it probable that in the Häme Lake District the hunter-fishers were Saami who practised slash-and-burn cultivation already in the Early Metal Age. They could not start any field cultivation, however, as annual circulation between summer and winter villages prohibited the essential prerequisite of farming: permanent houses (Salo 2008, 164–165).

I agree that the hypothesis about two culture areas can be accepted. However, the method of cultivation is not the best argument for proving it. According to Henrik Asplund (2008, 304) there have not been any fields of a “Celtic” / “Baltic” type in the area of today’s Finland. He argues that geological factors, i.e. the soils, were probably the main reason that this kind of agriculture was not introduced on the northern side of the Gulf of Finland. This is a new argument, as the classical explanation for the lack of evidence of settlement in the Pre-Roman Iron Age (4th – 1st centuries BC) has been the poor climatic conditions (Alenius *et al.* 2009).

At the moment, the earliest remains of ploughed fields are in the village of Salo in Laitila. According to Birgitta Roeck-Hansen and Aino Nissinaho (1995, 32), the dating is between ca. 350–600 calAD. It seems that the earliest cross-plough fields in the inland are at the dwelling site complex in Rapola, Sääksmäki parish in Häme. It is dated to 780–1217 calAD (Vikkula et al. 1994, 56). At Orijärvi in Mikkeli in the Savo district, the fossil fields have been excavated and analyzed very carefully. They were in use already in the 6th century AD and the cultivation continued in the Viking Age (Mikkola 2005, 57–58). In southwestern Finland, a few sites were suggested as candidates for ploughed fields and some data from the Iron Age have been connected with them.

In conclusion, it seems that knowledge about the history of field cultivation is inadequate in Finland until the Middle Iron Age (Asplund 2008). From that time on there is more evidence, and relevant results have been obtained for the late Iron Age (Mikkola 2005; Alenius *et al.* 2008). However, the oldest phase, Middle and Late Neolithic, definitely require further research.

3.4. Some viewpoints about the later phases of cultivation in Finland

Agriculture remained in a secondary role in the economy for the whole Bronze Age / Early Metal Age in all areas of the present state of Finland, even on the coast where the Scandinavian / "Germanic" influence was the most intense. The same can be said about the Karelian Isthmus and areas west of Lake Ladoga. In general, we can say that hunting and fishing were the dominant means of subsistence at the beginning Iron Age, too, with the exception of the coastal zone from southwestern Finland to central Ostrobothnia in the north and a few sporadic areas in the inland. From the 6th century AD onward, the cultivated crops and plants become more frequent in the palynological record (Simola *et al.* 1991; Taavitsainen *et al.* 1998).

In the early phase, the agricultural lands were used for a few years only and the risk of a poor harvest or no harvest at all was apparent all the time. In places the cultivation ceased for years or for a generation before a new trial can be observed in the pollen profile. The transition towards more continuous cultivation proceeded in two ways, depending on the local environmental conditions. In the most favourable coastal zone, field cultivation got its proper start following the end of the cool climate period after the 4th century AD. In Häme, Southern Savo, and Karelia, the slash-and-burn sites were used more often but without exact time when to come back. The settlement was quite sparse and the forests with large uninhabited regions may have remained without cultivation for long periods (Vuorela 1999; Alenius 2007; Alenius *et al.* 2008).

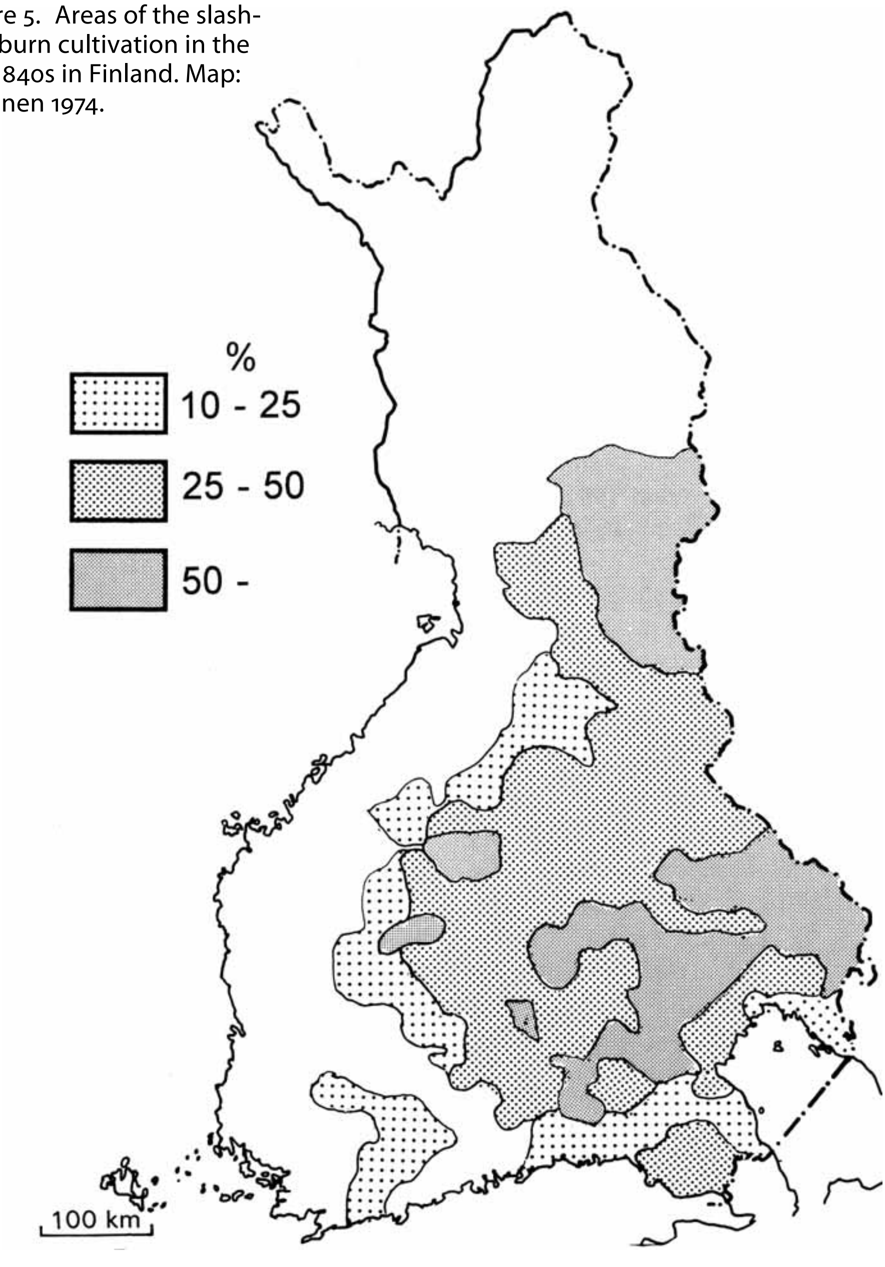
In the Late Iron Age, the habitation grew remarkably in areas where soils were suitable for field cultivation and the climate permitted good or modest harvests in most years. As ploughed fields require manure, the role of animal husbandry cannot be underestimated from this viewpoint, either.

The important cultivation fields during the Iron Age were on the southwestern coast (Finland Proper), in Satakunta (the River Kokemäenjoki area), and the area in and around the town of Mikkeli in southern Savo (Orrman 1991; Mikkola 2005). However, in eastern Uusimaa and the Kymenlaakso district (in and near the valley of the River Kymijoki) the data are still missing. On the Karelian Isthmus permanent cultivation of fields reached a productive level between the 5th and 9th centuries AD (Simola 2003, 114–115) but in a few areas the settlement remained quite scanty, though (Uino 2003, 295).

Along with field cultivation, slash-and-burn cultivation also did not lose its meaning in the economy during the Iron Age or in the medieval and post-medieval periods in Finland. In eastern and northern Finland, it continued until the beginning of the 20th century (Linkola 1985). There are several different methods for slash-and-burn cultivation and these were applied when cultivating plants like cereals in different climatic conditions (Nieminen 2005, 5–9).

The agricultural fields were not far from the dwelling sites (houses), of course, but a few suitable sites for cultivation were located further away and taking care of them required that people overnight in huts or temporary shelters

Figure 5. Areas of the slash-and-burn cultivation in the late 1840s in Finland. Map: Soininen 1974.



there (Fi. *kaukokaski*). In practice, the work was carried out by joint forces and the division of labour (between men) was organized according to common rules (Fi. *kaskiyhtiö*) (Vilkuna 1977).

The well-developed knowledge of swidden cultivation was probably one of the reasons why colonisation of new areas proceeded fairly quickly in eastern Finland during the Middle and Late Iron Ages and more actively, as in the medieval and historical periods (Taavitsainen 1987; Simola *et al.* 1991). Good harvests were produced, however slash-and-burn cultivation was destructive to forests. In the 18th century, the exploitation of forests became even more difficult due to the production and overseas trade of tar becoming a profitable part of the livelihood of the peasants (Fig. 5). After the end of the era of wooden ships, tar lost its importance. At the same time, the millennia-long tradition of slash-and-burn cultivation was almost extinct.

4. Early cultivation in Finland

4.1. The sites and interpretation of sedentarity

Above, I have tried to discuss the reasons that dwelling sites are difficult to find in the coastal zone of Finland from the Early Metal Age. A further challenge is to find out more carefully whether certain areas in southwestern Finland were settled by two populations during the first and second periods of the Scandinavian Bronze Age, between 1700–1200 BC. First, the groups representing the local tradition of the Stone Age were named after the eponymous site of Uotinmäki, located in Kiukainen in Satakunta. Second, a culturally and probably also genetically new population emerged due to the influence of visitors from the areas with the Scandinavian populations. The difference between the material cultures of these two peoples can be seen in ceramics. The most visible feature is stone cairns (Fi. *röykkiö*, *vare*) which were built by these aforementioned groups in particular. A small number of bronze implements belonged to them, too, but the evidence of dwelling sites and their settlement structures is almost missing (Meinander 1954a, 1954b; Salo 1984; Edgren 1992; Huurre 2005).

In Finnish archaeology, the sites have often been separated between the coastal Bronze Age and the Early Metal Age site in the inland (Meinander 1954b; Carpelan 1982; Salo 2004). The main argument has been that the large stone cairns are on the southern or southwestern coasts. Further, rectangular house remains have not been found at all on sites, which date to the second millennium BC in the inland (Tallgren 1931; Salo 1976, 1984). In the inland these are also very uncommon. The coast in northern Osthrobothnia is a region of its own, where the dating of cairns does not fit the model of southwestern Finland.

In this context it is necessary to underline that the Kiukainen groups lived on the southwestern coast of Finland. Clay vessels characteristic of the inland have textile impressions on their surface, hence the term Textile pottery. One should keep in mind that although we call the ceramics either Textile ceramics or Sarsa-Tomitsa ceramics, the surface impressions are often not made by a textile. The impression may have been produced by many different types of implements (Patrushev 1993; Lavento 2001). The Sarsa-Tomitsa and Textile ware differ considerably from any of the ceramic types on the coast. It is interesting to note, however, that Textile pottery can be found in several areas in the coastal zone. Textile impressions on ceramics have been found at dwelling sites and on some hillforts by the River Volga and its tributaries (Lavento 2001).

It is accepted by many Finnish scholars that grazing fields for domestic animals and cultivation fields near the dwelling sites were in use during the Bronze Age, but in the inland, houses with meadows and fields nearby did not develop before the Iron Age (Carpelan 1982; 1999; Salo 1984; 2004). It is true that so far neither Early Metal Age permanent fields nor Scandinavian house remains have been found in the inland. However, this does not indicate any straightforward division between the coast and the inland, as the remains of Bronze Age fields have not been found on the coast, either.

The chronology of the coastal Bronze Age is coarsely known through bronze finds and the shore displacement, while detailed datings are missing. The cultivation of fields close to houses may have begun from the second half of the Scandinavian Bronze Age, at the beginning of the first millennium BC (Holmblad 2010). In the inland, the synchronous sites have been found, but the observations do not give any observable evidence of fields like this. Slash-and-burn cultivation had remained there as a central method of cultivation.

In some cases the macrofossils also indicate cultivation in the inland. One example is the dwelling site at Kitulansuo d in Ristiina, in Southern Savo district. A grain of barley has been AMS-dated to the Early Metal Age (Lavento 2001, 139). The interpretation of the site is complicated because ceramics and other find material seem to belong to a hunting-fishing population, which used it from the beginning of the first millennium BC to the end of Early Metal Age. Nevertheless, there were some pieces of coastal Bronze Age ceramics at the Kitulansuo d site, too. An interesting iron smelting furnace was uncovered there, which may have been in use at the beginning of Common Era or even as late as the 5th century AD (Lavento 1999).

At first sight the environment around the dwelling site at Kitulansuo does not look suitable for cultivation. The soil is sandy and the natural vegetation is pine forest. The site is surrounded by mires and in a few places the surface is plain bedrock. Nearby, on the bedrock formation, there are three Lapp cairns which are usually connected with inland graves both in the Early Metal Age and in the Iron Age. Most of the Lapp cairns in the municipality of Ristiina are small and for this reason are difficult to observe. This may have been the reason why they remained undiscovered until the late 1980s.

In addition to Kitulansuo, there are also other sites in the inland, which indicate connections to the coast in the Early Metal Age. For example, the coastal type of ceramics named after the eponymous site Paimio (near Turku) have been found at the Hiukkasaari dwelling site in Tyrvää, in the valley of the River Kokemäenjoki. Other finds in the same context included Textile pottery of the Sarsa type and Luukonsaari ceramics, which belong to the group of Säräisniemi 2 and to the tradition that began ca. 800 calBC in the inland and northern Osthrobothia. In Tyrvää, there is another site, Haapakallio, where Luukonsaari pottery and Textile pottery were found along with scratched surface ceramics (Fi. *naarmupintainen*) (Salo 2004, 155). Scratching belongs to many ceramic types of the first millennium in the large area of the Baltic Sea. The complex find contexts of finds at these sites indicate the connections between coastal and inland groups. The examples of visiting in different environments have been made by coastal and inland populations (Lavento 2009).

During the Neolithic, sites were of the village type on the coast and also inland, as a large amount of depressions and the semi-subterranean houses are known. Unto Salo's (1994; 2004) model concerning the large Bronze Age "villages" and Christian Carpelan's (1982) view about the sites of small farms (*gårdar*) have emphasized these sites as examples of the way foreign populations lived on the coast. In the Early Iron Age, there are almost no dwelling depressions or any other kind of easily distinguishable evidence of dwellings visible at the sites. On the coast, there was not any great break in the tradition of the buildings at the settlements, although their number is not considerable. What happened was a quick change in the material culture. The groups were small and people probably lived in huts, which did not leave much evidence for archaeologists to find.

The small size of the inland sites and the thin culture layers give an impression that people did not settle in one place for a long time, but that instead the sites were visited seasonally. It should be noted, however, that in a few cases there are relatively large Early Metal Age sites, too, and some dwelling depressions have been found in Early Metal Age contexts (Lavento 2001; Schulz 2002). Leaving the exceptions aside, the Early Metal Age sites resemble neither Neolithic "villages" in the inland nor Bronze Age "villages" in the coastal zone of Finland. Change towards a more mobile way of life can be observed in Karelia in Russia, too (Lavento 2001; 2005). This evidence has been discussed by several researchers in Russia (Kosmenko 1992, 1996; Zhulnikov 2005), Sweden (Forsberg 1985; Lundberg 1987; Norrberg 2008), and Finland (Okkonen 2003).

All categories of archaeological artifacts – finds at sites or stray finds – prove that the size of the population decreased in a large area in Eastern and Central Finland at the turn of the Late Neolithic / Early Metal Age (Lavento 2001; Okkonen 2003). The decrease in the number of sites gives the same indication. This development is observable in most parts of Finland, up to the River Kemijoki region in the North, as well as, in northern Lapland, though the finds and some datings indicate continuation in the settlements. Still also there, the amount of people may be smaller than during the Neolithic (Carpelan 2003; Halinen 2005). The overlapping populations have been assumed to have existed on the southwestern coast, where the influence of the Kiukainen groups and Bronze Age population are known.

In the inland, there is one striking feature, which should be noted. The number of Lapp cairns is considerable also there. Hundreds of Lapp cairns are known in the inland, although their number is small in relation to the known cairns in the coastal region. It is evident that inland cairns have remained somewhat unstudied so far and that their number will grow when more surveys are conducted. This increase in material and accompanying careful study will also bring up many new aspects about their chronology, contexts, and relations between influences coming from different areas (Saipio 2011).

Although the essential empiric evidence for the mobility hypothesis can be seen as adequate, the reasons for it are all but self-evident. In the following, I will not seek the reason for the drop of the population size. Instead, I will approach the question by asking in what ways the populations that survived were able to organize their economy. The role of cultivation will be emphasized, in particular. The discussion concerns both the coast and inland but not northern Lapland, as cultivation was not practised there prior to historical time. According to contemporary data, agriculture was not introduced there during the Late Neolithic or in the Early Metal Age.

4.2. Overview on a larger scale

Already at the final stage of the Neolithic and during the Bronze Age, small local groups had to change their settlement pattern on the coastal zone and in inland Finland, in particular. In the inland we know only a few sites from the transition period. Although the new archaeological surveys have uncovered a considerable amount, the number of Neolithic and even Early Metal Period sites have remained few. One reason for this may be the way archaeologists approach their survey. It follows the shore displacement model by accepting the hypothesis that the environments used in the past were in sandy moraines or eskers on particular shore levels – all calculated for each area. The sites concentrate on the Stone Age type of cultural milieus, which are well-known to us from previous experience. In other words, we have probably not yet found suitable models for tracing the Bronze Age / Early Metal Age layers of these landscapes.

One possibility for approaching this problem is to assume that the "missing" sites and groups of people are invisible in the archaeological record simply due to their way of using the environment, i.e. slash-and-burn cultivation. The sites are located in ecological milieus different from those of the hunting and fishing groups and the archaeological remains are not of the same type, either. What we need is a new kind of survey methodology.

The earliest phase of cultivation from ca. 2300 calBC onward (Vuorela 2002) did not change the communities in any dramatic way. The amounts of *Cerealia* pollen in the pollen profiles are very small and thus it is reasonable to assume that food production did not radically increase either in the coastal zone or in the inland. The development of the culture has been seen in the light of cultivation which led to the changes in the social patterns and culture on the coast. It was still not necessarily the case in the inland, where the Stone Age type of settlement continued (Tallgren 1933; Kivikoski 1961; Huurre 1979). This statement has recently been called into question on the grounds of archaeological (Carpelan 1999; Lavento 2001) and palynological data (Tolonen, K. 1982; Grönlund *et al.* 1990; Vuorela 1999), although many characteristics of the economy did not change quickly.

If it is assumed that cultivation came to Finland together with the Battle Axe culture, then this should mean that it would have changed local cultures radically. It is evident that the dating results obtained so far do not support without problems the synchronous arrival of the Battle Axe population and the earliest cultivation in Finland. It is assumed that societies developed towards animal husbandry, i.e. by keeping sheep and pigs (Edgren 1970; 1992; 1999). Human influence in the forests has been recorded in the pollen data in many areas in Finland (Vuorela 1982; 1999; 2002). The process started in many phases but cultivation became established when the first Kiukainen ceramics appeared in the archaeological material (Alenius 2007; 2008).

A considerable cultural change took place in Finland since the period between 1900–1700 calBC. The settlement structure changed on the coast and people moved closer to environments where field cultivation was practised. The displaced shores in the lower terraces of the eskers and end moraines reached silts and clays. Still, at least some sites have been found in areas where shore displacement influenced the water systems and more clayish soils. Normally the population did not live close by the new potential agricultural lands.

The transition to an economy where agriculture was in the dominant position took a long time. It seems possible that both in the coastal zone and inland the process lasted in Finland maybe even longer than 2000 years. We might wonder why this period was so long. The traditional argument is the degradation of climate, which began ca. 3000 calBC (Äyräpää 1922; 1939; Kivikoski 1961). On the basis of contemporary information, agriculture arrived in Finland at a disadvantageous time. This argument is sensible, but it requires more detailed research.

In light of the material presented above, we know that agriculture may have been practised in its various forms despite the difficulties which were caused by the harsh climate conditions (Vuorela 1982; Vuorela & Hicks 1996; Vuorela 1999; Grönlund *et al.* 1990). Further, the traditions of slash-and-burn and field cultivation have continued through the Iron Age and medieval and post-medieval periods, although the climate conditions have not been the best possible at that time, either. Although climatic cooling should be accepted as one reason for slow adaptation of agriculture in the early phase, it is not the only reason for this situation. It seems that cultivation did not continue without breaks in any area in Finland (Alenius 1998; Asplund 1998).

In the Häme and Southern Savo districts the conditions for crop rotation were less favorable than on the coast. Thus field cultivation was not adopted before the Middle Iron Age there (Vikkula *et al.* 1994; Mikkola 2005; Alenius *et al.* 2009). Prior to then, agriculture followed other traditions. The beginning of firm settlement in fields close to the farm houses dates back to the Iron Age. The validity of this argument has been indicated by the fossil fields (Vikkula *et al.* 1994; Mikkola 2005).

Slash-and-burn cultivation with its different variations prevailed for a long time both in the coastal zone and in the inland as an important means of cultivation. Agriculture was not the main source of livelihood. Local societies were small and the preserved archaeological sites are small, too. Until the Middle Iron Age most of these sites were seasonal in character and were used not only for agriculture but also for hunting, fishing, and grazing animals. However, the same site could be in use for a long period of time. During the later part of the Early Metal Age, islets were found in the inland. These sites are favorable for keeping sheep and goats (Lavento 2001). Examples of sites of this kind are known first of all in eastern Finland. As in many cases the bone material has not been preserved or analyzed, this hypothesis cannot be verified.

Two assumptions concerning late Neolithic and Bronze Age / Early Metal Age culture can be proposed based on the discussion presented up to this point:

1. Dwelling sites were not chosen for their suitability for agriculture. Slash-and-burn cultivation took place, but not necessarily in the immediate vicinity of the dwelling sites.
2. Dwelling sites were not located close to the slash-and-burn fields, although pollen analyses nevertheless may indicate human activity in the region.

Regarding the first assumption, in light of contemporary data, the long adaptation process of slash-and-burn cultivation continued alongside other means of subsistence. Slash-and-burn cultivation was known since the Late Neolithic but it did not play any dominant role prior to the Iron Age.

My second assumption is that the difference in the economy between coastal and inland groups was not as sharp as it has often been emphasized. The question is more complicated and needs rethinking. Small scale animal husbandry was practised in the coastal and inland environment. The archaeological data which have been collected so far do not indicate unambiguously clear evidence of “villages” (Sw. “*gårds*”) resembling those in southern Scandinavia. In practice, the traditional economy continued during the entire research period.

5. Conclusions

Summing up the results obtained from pollen analyses tells us that agriculture has been practised in most parts of southern, eastern, and central Finland since the Late Neolithic. According to the available pollen data, this statement comprises all districts in Finland except northern Lapland. The pollen material available dates the beginning of cultivation to the Battle Axe although an even earlier start to cultivation in Finland is possible.

In the first phase of cultivation, slash-and-burn cultivation reached Finland, which can be observed in many areas across Finland. The experimental agriculture increased and in the final stage of the Kiukainen culture it became more or less the permanent economy. Cultivation ceased locally but it continued in some other locations. This kind of local discontinuity is evident until the Pre-Roman Iron Age. The slash-and-burn technique was the way to practise agriculture during the entire Bronze Age in the coastal zone; it was the tradition in the inland throughout the Early Metal Age.

Fossil fields are not known in periods earlier than the Iron Age in Finland although they should be possible to find here. The reason for the late dating can be the unsatisfactory state of archaeological research. Fields such as these are not known in the Bronze Age / Early Iron Age. Finding these early fossil fields is an important challenge for Finnish archaeological research, as it should help us understand when permanent habitation in farmhouses began.

We know that agriculture was practised during cooler climate periods and not just during warm phases. In this article it has been pointed out that despite the disadvantageous climate after ca. 3000 BC, slash-and-burn cultivation continued in several areas. Archaeological data have remained insufficient in the coastal zone and in the inland. The challenge is to investigate places, which have been climatically more profitable than others, especially from the point of view of the frost problem.

According to contemporary data, the early phase agriculture became known among hunter-fisher groups in different parts of Finland. However, early farmsteads emerged in the southwestern part of the country, but probably not earlier than the late Neolithic Kiukainen ceramics. The first agricultural societies date to the Pre-Roman Iron Age but agriculture was not adopted as the main means of economy prior to the Roman Iron Age. Relatively soon a corresponding change took place in the Satakunta, Häme districts. On the Karelian Isthmus and Southern Savo, the same development repeated in the Middle and Late Iron Age.

On the basis of archaeological remains, peasant settlements should be easier to discern than in preceding periods. However, the task has not proved to be easy. In the coastal zone at least one candidate – the Rieskaronmäki site in Nakkila – is known, but in the inland there are no sites, which would fit the description of a farmhouse. It is the challenge of the future to better understand the settlement structure of the Late Neolithic and Bronze Age sites in Finland. The distinction between these two separate cultures still requires revision.

The linguistic evidence can be connected with the various phases of cultivation and animal husbandry. Some place names indicate the adoption of different types of agriculture. The analysis of loanwords gives us hypotheses about the direction of these innovations, as well as, their relative dates. The relative datings of the words are problematic because of the wide flexibility of the time scales. Although they do not solve the problem of determining when and where cultivation began, they can be connected with the archaeological evidence, macrofossils, and pollen data.

These interpretations are suggested by the researchers, but we should not forget the creativity of people in the past. Environmental conditions varied during the long period from the middle Neolithic to the Iron Age. The introduction of cultivation was not a revolution in the economy either on the coast or in inland Finland. It was a slow process combined with the economies that were based on hunting, fishing, and gathering. Together with the growing importance of animal husbandry, cultivation proceeded when the populations grew. In the periods when populations stayed small the role of cultivation was important.

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From Entities to Interaction: Replacing pots and people with networks of transmission

1. Introduction

The understanding of the relationship between language, ethnic groups, and material culture in prehistory is still very limited, even within highly competent academic communities. To researchers without archaeological training it may be easy to make a direct association between archaeological cultures, distribution of significant artefact types, and ethnic groups, especially as such explicit links are occasionally made also by archaeologists (e.g. Carpelan 2006). While there is undoubtedly some association between material culture and ethnicity (Damm 2010), and by inference perhaps also language, this is not straightforward, and is in many respects still poorly understood.

In my opinion it is not possible to argue for any one-to-one relationship between archaeological categories, be they cultures or artefact types, and ethnicity and language. I believe that we have to develop a very different approach to the relationship between material culture, mobility, and interaction, before we are able to discuss to what extent any distribution of similar material may be linked to the spread of language.

In the following I will first briefly summarise why archaeological entities are problematic to use as a basis for ethnic groups. I will then present an alternative springing from the so called *chaîne opératoire* approach, in this case the complex technological process of making pottery. After a more general excursion into pottery production in northern Fennoscandia, I will finally indicate the advantages of the approach by looking at the use of asbestos temper in the area. This is only meant to serve as an illustration of the approach, and is based only on a brief study of available publications.

A Linguistic Map of Prehistoric Northern Europe.
Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 41–62.

2. Archaeological entities: cultures and pots

Archaeologists have always been fond of producing maps demonstrating the general distribution of particular types of artefacts or structures. In some earlier publications several subgroups of pottery from the Early Metal Period are presented together on maps as one group (see figures 1 and 2), termed either Asbestos pottery covering northern Fennoscandia (e.g. Jørgensen & Olsen 1987: 6; Hulthén 1991: 3) or Textile ceramics covering Finland and adjacent areas in Russia (e.g. Lavento 2001: 15). These publications recognise that these more general categories in fact embrace much typological, chronological and geographical variation. However, as they choose to illustrate the overall and general distribution, readers from other disciplines, who cannot be expected to be familiar with empirical details, are provided with the impression of cultural homogeneity over large regions.

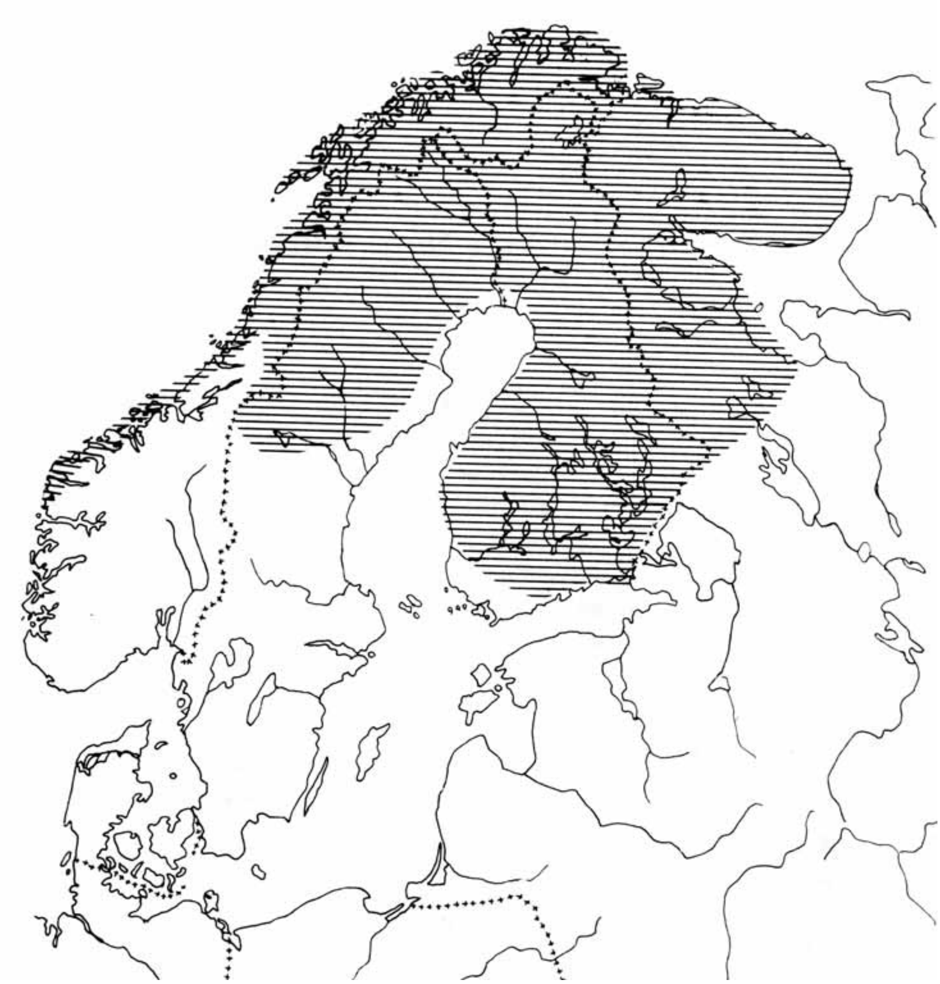

Figure 1. The distribution of Asbestos pottery according to Jørgensen & Olsen 1987.

For the better part of the 20th century archaeologists were prone to link the distribution of various types of pottery to different cultural and ethnic groups. This sprang from culture historical archaeology, which focussed on archaeological cultures. To discover an archaeological culture one mapped a number of cultural features and attributes such as house constructions, distinct burial types, specific artefacts, ornaments, and, of course, pottery. If several distinct types could be seen to be consistently found together in a clearly delimited geographical area, it was argued that they made up a cultural assemblage or an archaeological culture (fig. 3). The Corded Ware culture is, for example, characterised by a set of cultural features, which include beakers with ornaments made by twisted cords, battle-axes, and single inhumation graves where the body is placed in a flexed position. Such cultures were frequently perceived to represent distinct cultural groups, and implicitly or explicitly associated with a 'people'.

Since pottery generally displays greater variation in time and space than, for instance, stone tools, many such archaeological assemblages or cultures were named after the pottery: Trichterbecher Kultur (Funnel Beaker Culture); Schnurkeramisches Kultur (Corded Ware Culture); Pitted Ware Culture; Comb Ware Culture etc. Perhaps for that reason pottery is often seen as the artefact most closely linked to the concept of peoples or ethnic groups, and one may see references to 'Corded Ware people' or similar expressions. Pots came to stand for people.

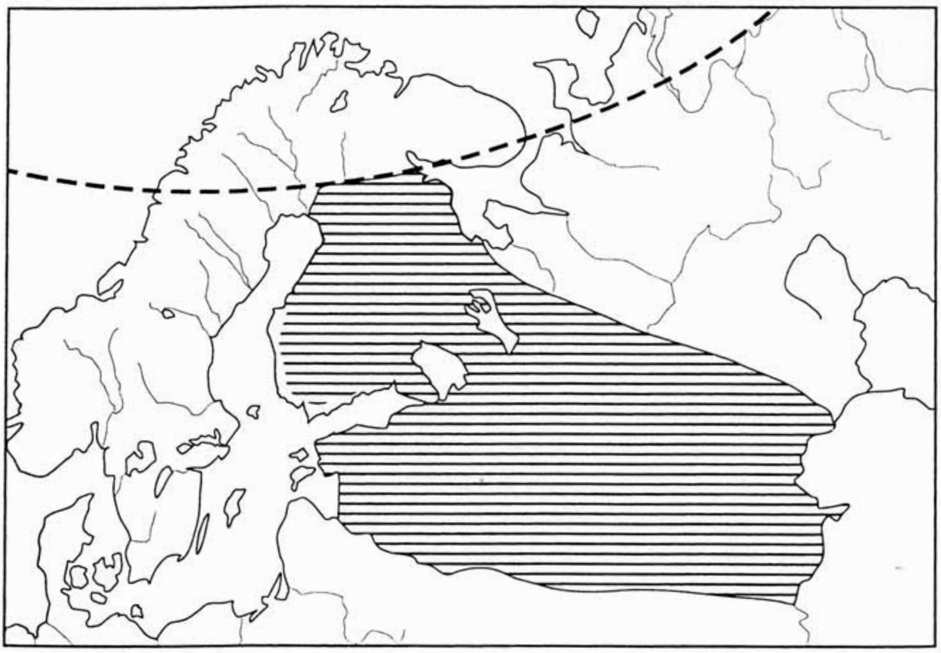

Figure 2. The distribution of Textile ware according to Lavento 2000.

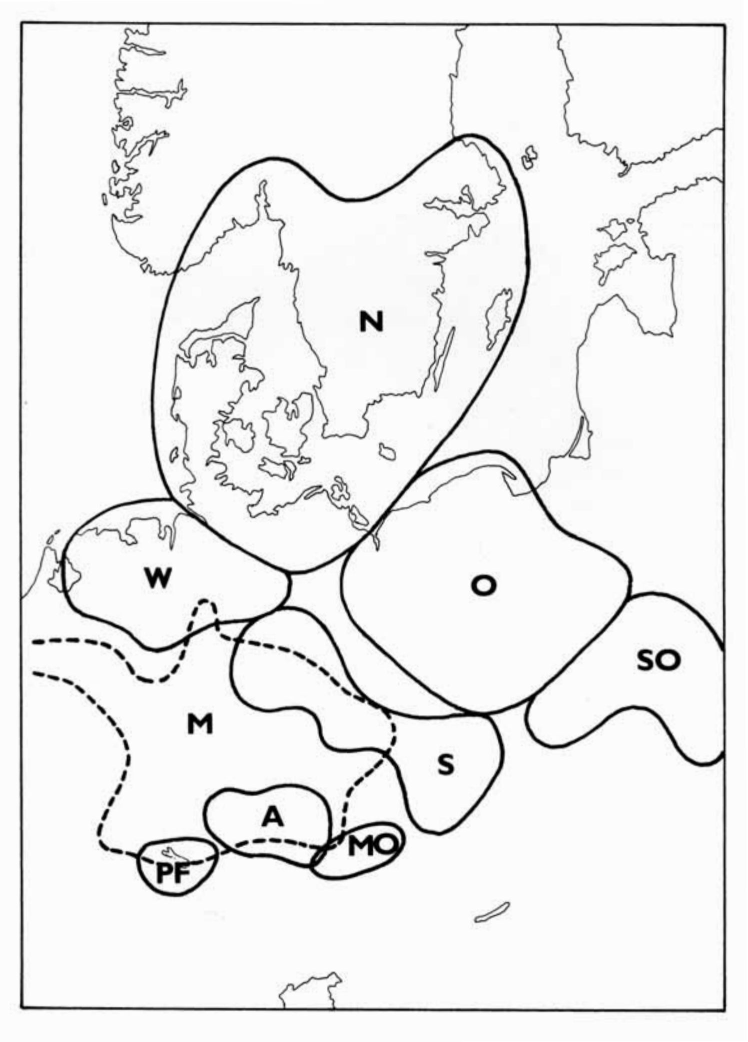

Figure 3. Example of the distribution of archaeological cultures. (From Zápotocký 1992: 552.)

One of the basic premises of the culture historical approach was the belief that past societies (in particular hunter-gatherers and early farmers) changed only gradually and rather slowly. While change in just one cultural element might be caused by diffusion of ideas and technology from neighbouring societies, major or abrupt changes in several features were assumed to represent immigration of a new group of people. Typically, the result was narratives with a succession of waves of immigrating groups. This essentialist perspective on human societies has been rejected by more recent theoretical and methodological approaches.

One of the problems in associating archaeological cultures with ethnic or linguistic groups is that only seldom do all the attributes and features ascribed to any such culture have exactly the same distribution pattern. Mostly, what we get are somewhat differing distributions of each of the selected criteria, although, of course, with some overlap. If we draw circles around each of these distributions we may find an area where they all occur together – and this is considered the 'core' area of the culture – but this leaves us with numerous finds outside this area, that cannot be accounted for in this model. An example of this is the Corded Ware Culture in Northern Europe, which, of course, is one of those archaeological cultures that have been most explicitly linked to a distinct ethnic group. Battle-axes of the Danish type have one distribution, that of curved beakers another, amphorae a third (Strueve 1955), not to mention the fact that Swedish axes and beakers are quite distinct from the continental types. Deciding the distribution and location of the culture is possible on a very coarse scale only.

Similarly, the use of archaeological assemblages or cultures that explicitly build on the coherent distribution of characteristic types easily provides the impression that such groups are socially as well as culturally homogeneous, while we know that societies are internally heterogeneous, being composed of a wide variety of individuals with different agendas, depending on their gender, age, social and economic status, kinship ties, etc. (Damm 2010, 2012).

In addition it is important to note that many artefact types are very heterogeneous. The well-known category of Textile pottery, for instance, is in Norway one of the most important categories of asbestos tempered wares (Jørgensen & Olsen 1987), while such temper is unusual in the type in Finland. And perhaps surprisingly, much Textile pottery is not decorated with textile impressions (in Finland this accounts for only ca 25% (Lavento 2001: 52)). With regard to the early northern Comb Ware, Skandfer concludes that “there is so much between-site and regional variation in pottery characteristics that the crisp classic definition of a distinct Sär 1 pottery is no longer tenable, making the whole concept of a ‘typical’ Sär 1 early Comb Ware in northern Fennoscandia redundant” (Skandfer 2009). Similarly the increasing number of ^{14}C dates on food crusts or birch bark pitch on Neolithic pottery in Finland now demonstrate that many of the types that were thought be chronologically successive, are in fact for a large part contemporary (Pesonen 2004). This demonstrates that instead of expecting homogeneity in prehistoric material culture, we are better advised to anticipate heterogeneity.

For more than half a century there have been intra-disciplinary debates with conflicting views on the extent to which an archaeological type reflects prehistoric categories. The archaeological definition of the individual types also has great impact on the result of the distribution of assemblages. Depending on the research question being investigated, different choices with regard to geographical scale, degree of stylistic and typological variation must be considered. While it is no doubt useful at times to be aware of the wider distribution of groups of pottery, such as Asbestos pottery or Textile ceramics, for other purposes it is imperative to call attention to the geographical, chronological, and technological diversity. To better understand the complex interrelationship between, for instance, pottery and cultural groups, I would argue that instead of attempting to build homogeneous entities we should consider the information provided by the vast amount of variation.

The traditional concept of archaeological cultures covering rather large geographical regions is considered outdated. Nevertheless the general approach does seem to have found a second life in the search for numerous local or regional groups (Damm 2010). Many studies demonstrate that within one culture or one pottery style it may be possible to find a number of subgroups on a regional or local level (e.g. Lavento 2001, Carpelan 2004, Bergsvik 2006). While the methodological approach in such studies is often highly commendable, and contributes to our knowledge of the societies in question, reducing the scale and size of groups fails to solve the main issue: when looking for entities, no matter how small, the goal is something coherent and homogeneous (a search for entities that may be clearly distinguished from each other). This prevents us from looking into the complexity of human societies (Damm 2012) and from using the fuzziness to actually understand some of the dynamics taking place.

3. From pots to *chaîne opératoire* and learning networks

I suggest that we shift our attention from cultural and typological entities to the various social dynamics that artefacts are a part of. The inspiration for the following is derived partly from Cultural Transmission studies (e.g. Jordan 2007; Jordan 2009; Jordan & Mace 2008) and partly from the anthropologist Olivier Gosselain's studies of pottery in western Africa employing the *chaîne opératoire* approach (Gosselain 1998; 2000; 2008b). In a *chaîne opératoire* study the focus is not on the finished artefact, such as a pot of a particular type or style. Instead one follows the entire process from extraction of raw material through numerous production stages to distribution of the finished artefacts, possible repairs, and finally the discard of the pot, although many studies emphasize the production sequence. In the following I will suggest that by looking at the distribution of technological choices at each stage, we may get a better image of the social interaction taking place between potting communities, and establish a better understanding of the background for the diversity of material culture and the links to social and cultural identities.

Gosselain has demonstrated (2008b) that in many places there is no simple correlation between any type of pottery, or indeed any element of pottery production, and linguistic or ethnic groups. He does, however, show that there are links between the choices made at various stages in the production and positive or negative associations between groups, and more or less direct interaction. In other words, some link between material culture and social (including linguistic) identity does exist – but it is a very complex one.

Pottery manufacture is a fairly complex procedure with many different steps:

- extracting and processing the clay
- acquiring and preparing the wanted temper
- kneading the temper into the clay
- forming the vessel
- decorating the vessel
- drying and finally firing the pots

More steps could be added, depending on the scale of analysis (Gosselain 2008a). This means that a fair amount of knowledge that has to be acquired before one becomes an accomplished potter. That knowledge will have to be transmitted through interaction between potters.

Knowledge is not only transmitted at the initial introduction to the craft, but may be exchanged under many different circumstances. As suggested by Gosselain (2008c) we may distinguish between intra-communal and inter-communal exchange of knowledge. Intra-communal transmission happens within a community. Most learning would have been of a more informal kind (Gosselain & Livingstone Smith 2005; Gosselain 2008b) rather than through formal apprenticeships. Children would assist parents and relatives in various tasks and acquire knowledge through observation and discussion amongst adults. At a later stage, they may have received some formal instruction. This transmission of knowledge would in many cases involve a combination of skills, knowledge of the landscape and resource area as well as social and ideological integration, the latter due to the many symbolic or religious concerns often involved in the production. Such vertical or generational learning networks would contribute towards continuity in technological practices. In other cases the learned practice may have been adjusted due to personal experience and experimentation or due to interaction and communication with others. Adult potters within a community may, of course, exchange ideas and experience, often through evaluation of their own finished products or those of others. Most intra-communal transmission is based on direct interaction between the potters.

Inter-communal exchange of knowledge happens when potters from different communities meet or when they see pots produced elsewhere. Importantly not all aspects of the pottery production require very close interaction in order to be transmitted (Gosselain 1998; 2000). Contact when travelling to kin and friends or for exchange and interaction at aggregation sites will suffice. As a consequence of this, some horizontal or relational learning networks also existed.

Some elements and techniques are visible on the finished product (decoration, tempers, vessel shape, etc). The visibility will allow many people to become aware of the choices made, even if they were not present during the production or in fact have never met the potter. Such production elements may be transmitted simply by seeing a different vessel shape or decoration, i.e. only the pot, not the potter has to travel. The reproduction of the technique may not be absolutely identical. A decoration pattern may be copied using a different tool; the temper may be prepared differently and come from a different source. Thus the similarity may be as superficial as the contact.

Other stages such as clay selection, processing and firing may not be visible on the finished vessel. The only way they are transmitted is therefore by closer interaction between potters and consequently these elements often reflect local or regional networks of interaction (Gosselain 2000: 192). An individual moving into a new area may either adopt new practices there or introduce craftsmen and women in that area to new techniques.

Finally a number of elements, perhaps in particular forming techniques, involve particular gestures and motor habits, and are more resistant to change and horizontal transmission (although for some modification of this see Gosselain 2008b). These are typically transmitted intra-communally and vertically.

4. Pottery production in northern Fennoscandia

In eastern parts of Fennoscandia, roughly east of a line from the western part of the Varangerfjord to the mouth of Kemijoki at the Gulf of Bothnia, pottery was introduced at around 5400–5200 calBC (Torvinen 2004; Kosmenko 2004; Skandfer 2005; 2009). North of the Saariselkä watershed (Skandfer 2003) in the northernmost parts of Finland and adjacent parts of Norway the production and use of pottery ceases again towards 4500–4200 calBC, with only very sporadic finds until the late 3rd millennium BC (distributions in Finland based on Pesonen 1999, dates based on Pesonen 1996, 2004). In the period 4000–2000 calBC the pottery in Finland and adjacent eastern regions pass through a number of stylistic and technological developments. In western parts of northern Fennoscandia (Norway and Sweden) pottery was introduced at a late stage, roughly around 2000/1800 BC, when the technology spread from the east (in the middle part of Swedish Norrland some Neolithic pottery dates to the 3rd mill calBC (Lindholm et al 2007)).

In the following a number of the most central steps in the production process are considered on a general basis, but taking into account that we are dealing with predominantly hunter-gatherer populations in northern Fennoscandia. Many of these communities are characterised by seasonal mobility, but each appear to have specific resource areas (Damm 2012).

4.1. Clay extraction and processing

We know that in Africa today clay is usually extracted within a 3 km radius of settlements (Gosselain & Livingstone Smith 2005). What is considered an acceptable distance will, of course, vary with the available means of transport, the perceived quality of the clay, and the importance of the craft. In northern Fennoscandia it is likely that much clay was extracted from fresh water sites (sediments deposited in shallow lakes, slow rivers, streams, river mouths). Fresh water clay retains plasticity better than salt water material (Skandfer 2003: 333). In Finland clays are most readily available in the sub-aquatic areas, although clay sources do occur in the supra-aquatic regions too (Lavento 2001: 46). Similar circumstances may have existed in Swedish Norrland, although again good clay sources are known from the interior (Hulthén 1991: 48). Accordingly, clays may have been fairly easy to discover in large parts of Finland and in the lower areas of Sweden. General knowledge of typical locations would have been sufficient to find clay. In other areas, such as Finnish Lapland and inland areas of Sweden and most of Norway, potters would perhaps have been more dependent on local knowledge. At the introduction or reintroduction of the pottery craft into a new area this would have been an important element. Knowledge of the locations would later perhaps have been passed on when new generations of potters helped with the extraction, i.e. extraction would have relied on intra-communal transmission.

The association with lakes and rivers also means that clay could have been transported by boat, allowing for extraction some distance from the location for further processing and production. There are relatively few analyses of clays from Fennoscandia, but in many cases sorted fine clays were used (e.g. Hulthén 1991: 17, 22; Brorsson, Isaksson & Stenbäck 2007: 419; Hallgren 2008: 185).

Although we have no knowledge of the further processing of the clay (removing impurities etc.), this is an important process. Again, since the actual process leaves no visible trace on the pots, transmission would have required direct observation.

4.2. Acquiring, processing, and adding temper

Some amount of other materials is almost always added in the final preparation of the clay. The temper may help retain or better the plasticity, minimise shrinking, and prevent cracking during firing (Papmehl-Dufay 2006: 140). Additionally, it may strengthen the pot, assist in reducing the wall thickness (Carpelan 1978), or in other ways alter the properties of the pure clay. Anthropologists, however, caution us that in many cases the choice of temper is less related to function and technology, than to other social mechanisms (Gosselain & Livingstone Smith 2005). Arguably one of the definitive functions of tempers in the Early Metal Period is the use of large amounts of asbestos in the 'asbestos ware' in northern Sweden, which would have enhanced the insulation capacity (Hulthén 1991: 34; for critique of this see Sundquist 2000).

In northern Fennoscandia the temper varies greatly in time and space, and is probably the most often employed technological element in archaeological studies. Tempers known to have been used in Fennoscandia include crushed quartz, sand, chamotte/grog (crushed pottery), granite, bone, mica, talc, asbestos, soapstone, pumice, ochre, limestone, amphibole/hornblende, feldspars, organic tempers such as hair, feathers, shell/eggshell, and various vegetation such as hay, grass (Jørgensen & Olsen 1987; Lavento 2001; Skandfer 2003; Pesonen 2004). In many cases more than one type of temper was mixed into the clay, and more rarely no temper appears to have been used or is not discernable.

Some tempers would have been readily available close to most potting sites. Other tempers are more regional or local in their distribution, e.g. asbestos.

The temper may be visible and discernible on the surface of the finished vessel, at least to an experienced potter. This means that it may be possible to be inspired to employ a different type of temper simply from seeing a pot. The more important question is, of course, why certain tempers are used and others not. Initially one would expect a potter to continue the tradition he/she was trained within. Other tempers may have been adopted through either experimentation or interaction with potters from other traditions. As noted above this may be related to perceived technical or functional advantages, but is often not. Gosselain's studies (Gosselain 2008d) demonstrate that even though potters in Niger are aware of alternative tempers, they are reluctant to use them. There the different temper 'recipes' are associated with different social and cultural groups. Newcomers into a potting community will often be gently pressured to shift to local norms.

Finally the temper must be kneaded into the clay. But in some cases temper appears to have been added during the building phase. Pasvik pottery and some Norwegian textile ceramics have a thick string of asbestos fibres placed horizontally just below the rim (Jørgensen & Olsen 1987).

4.3. Vessel building

A very common building method is coiling. Here coils are added successively on top of each other to build the wall of the vessel. The coils are drawn together by smoothing the inner and outer wall. This smoothing may be directed upwards or downwards and often in different directions on the inside and outside, thus creating recognisable patterns (U-N-∩) when looking at the vertical cross section of a sherd. The Neolithic Early Asbestos ware in Finland was built through coiling with a U-type smoothing (Pesonen 1996: 12), the Neolithic pottery in Swedish middle Norrland was coiled using both U and N-technique (Lindholm et al. 2007: 208).

Coiling is by far the most common technique in prehistoric pottery in Fennoscandia, but other methods do occur. Different techniques may be used on different parts of a vessel. The Early Metal Period in particular saw the introduction of other building techniques (Carpelan 1978). Some vessels were built over a wooden log or mould and occasionally imprints of the wooden structure are preserved on the inside of the vessel (Kleppe & Simonsen 1983; Hulthén 1991: 17). According to Hulthén (1991: 38) the large amount of asbestos temper in the Swedish asbestos ware makes it impossible to use the coiling method, and here the alternative was the log method. There is some indication from Sweden that some vessels were made using another vessel as an internal mould, as there are negative imprints of decoration on the inside of the vessel (Hedman 1993).

Since the beginning of the early 20th century, suggestions have been made that the so-called textile impressions are the result of a special building/shaping technique, where the clay vessel was formed inside a vessel made of textiles or baskets with such patterns (overview in Lavento 2001: 54). With regard to the Fennoscandian material there are at present no studies that confirm that the impressions were related to the building of the vessel, rather than a secondary feature. The possible exception is the negative imprints mentioned above, suggesting the use of moulds.

4.4. Vessel shape

The vessel size and shape is one of the most easily observable elements of the pottery. They are, of course, to a certain extent determined by the function of the vessel, but this still leaves a wide range of options. While the general shape of a vessel may be copied easily, variation on rims is perhaps an element that is partly akin to decoration, and partly an aspect of shaping. In the latter case, rim forms could be more closely linked to local and regional preferences associated with direct and long term interaction. Unfortunately even these elements may not always be possible to determine due to fragmentation in the prehistoric pottery.

4.5. Decoration

When studying prehistoric pottery it is not always possible, nor of interest, to distinguish final surface treatment from ornamentation. Of importance here is partly the techniques used and the visible result on the finished vessel. Some treatments may have been done either to smooth or roughen the final surface of the vessel (i.e. adding slips (a thin solution of clay and water) or scratching/hatching the surface). Slips are common in Comb Ware[1] (Skandfer 2003: 133) and various forms of surface treatment are noted in Swedish Norrland (Lindholm et al. 2007: 209). Décor may consist of plastic moulded elements, but for the northern Fennoscandian material most décor is made through imprints of various sorts in the clay. These may be made by the potter's fingers, with sticks, lithics, bone, shell, cords, or stamps made specifically for this purpose. The variation in imprints and patterns are, in addition to vessel shape, the elements most used to distinguish archaeological styles in pottery.

Ornamentation/surface patterns are, of course, easily copied, even without interaction between potters. However, unless you know exactly what kind of tool was used, some variation in the actual imprint may be observable. Similarly, stylistic similarity may be easy to copy, but more complex decoration schemes are likely to be identical only where closer interaction between potters occurs. It must be remembered that ornamental patterns may have existed on other, not preserved material as well, i.e. there may have been several sources for transmission of patterns.

The use of surface colouration or paint is also known from northern Fennoscandia, primarily in the form of ochre. The use of red ochre is very common on Comb Ware. When fired the ochre melts onto the surface as a thin glaze (Skandfer 2003: 134). Black colouration is known, for example, from late Early Metal Period wares (Lavento 2001: 60), but also elsewhere (Holm 1999: 135).

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[1] Perhaps the use of a slip explains the observations that comb ware pottery on the Kola Peninsula was built using 'double moulding' (Gurina 1987: 41).

Preparation or decoration of the vessels after firing is also possible, e.g. through applied paint or by filling the imprints with a paste. In Southern Fennoscandia there are examples of a white paste made of crushed shell. Covering the vessel with resin after firing makes the surface smooth and the pot more watertight.

4.6. Firing

The firing is a very important element in the process with great impact on the final result. The temperature and access to air, either oxidised or reduced atmosphere, during firing determine the hardness and the colour of the vessel. For the Neolithic and Early Metal Period pottery of northern Fennoscandia there are no indications of ovens or kilns, i.e. all firing seems to have taken place in the open (Hulthén 1991; Lavento 2001: 60). Even without kilns there are many possible options: simple hearths or firing pits, the choice of fuel, how to build the fire and how to place the vessels, whether or not to cover the pots (to obtain reduced atmosphere) etc. (Sinopoli 1991: 31).

The transmission of firing techniques require direct interaction between potters, as the process leaves few distinguishable traces on the pottery.

4.7. Transmission of pottery production and styles

Certain elements of the production sequence, in particularly tempers, are dependent on the availability of specific resources, either locally or through exchange. Other elements, such as clay sources, the treatment of tempers, building processes, complex decoration schemes, intricate stamps, and details of the firing, can only be correctly copied through direct transmission of knowledge. And some elements only require visual observation of other pots, e.g. shape, decoration, and perhaps temper. What may be 'read off' the pot is of course dependent on how accomplished the observing potter is. The copying of many of the latter elements will naturally occur intra-communally or through more direct interaction – the point here is that in principle this is not a pre-requisite for transmission of these traits.

Unfortunately the traits that require least interaction are the traits that dominate archaeological research on pottery, and which consequently form the basis for discussions on interaction regionally and interregionally. It would appear that the more technical elements of the production, such as building techniques, are most dependent on direct and close interaction of an intra-communal kind. The spread of such aspects may therefore be more closely tied to demographic movement such as marriages or other events that would allow potters to interact and work together for longer periods.

The transmission of other elements indicates inter-communal interaction of some kind. We must expect people from dispersed communities to meet and interact under many different circumstances. They may meet at aggregation sites or trade fairs for exchange or ritual activities, people would have travelled to visit kin, people relocate through marriage, and with irregular intervals deaths or other unforeseen events would have forced people to move temporarily or permanently to other locations. It need not always be the potters that move between communities. As noted above, some elements may easily be copied and it would be possible for a skilled potter to copy elements from a pot brought into a community from elsewhere, as a gift, as part of an exchange. However, pots do not travel on their own, but needs to be transported by somebody, travelling for some reason or another.

Finally, the reason for transmission of various elements may vary. New elements may be transmitted due to incoming craftspersons that teach new potters a different technique, elements may be adopted because they are perceived to be superior or because the function of the vessel changes, and in many cases the adoption or rejection of elements is based on positive or negative social and cultural associations.

5. Asbestos tempered pottery

Summing up the discussion above, there is a lot of unrealised potential for analysis of the northern Fennoscandia pottery, if we discard typological entities and proceed to consider individual elements of the *chaîne opératoire*. Different technological aspects may have been transmitted in very different ways and for different reasons. Consequently, they may have separate distributions, which do not correspond to any typological or stylistic group.

In the following I will consider the distribution of asbestos tempering. The asbestos is an obvious element to focus on as it is not readily available everywhere, and as this is the temper used when the craft spreads north and east into Norway and Sweden ca 2000 calBC.

5.1. Asbestos sources and types

The most prominent asbestos sources in Finland are found in the Tuusniemi-Kaavi-Outokumpu area in eastern Finland (Figure 4). A few occurrences are found in Kainuu and in southwestern Lapland, and then there is a belt of locations from Sodankylä to Kittilä (Lavento & Hornytzkyj 1996: 52). Further east there are known sources in the River Vyg area close to the White Sea, as well as on the west and southeast shores of Lake Onega. In Norway, asbestos has been found at lake Virdnejavre on the Finnmark Plateau and at Alta (Sundqvist 2000: 51), while asbestos deposits are found in several places in Swedish Norrland (Hulthén 1991: 14). There is no direct information available concerning asbestos sources in Troms and Nordland, but there is every reason to believe that local sources existed in the area, as soapstone occurs in numerous places (see below).

The three most commonly used types of asbestos are actinolite, anthophyllite, and chrysotile (Lavento & Hornytzkyj 1996). The first two are commonly

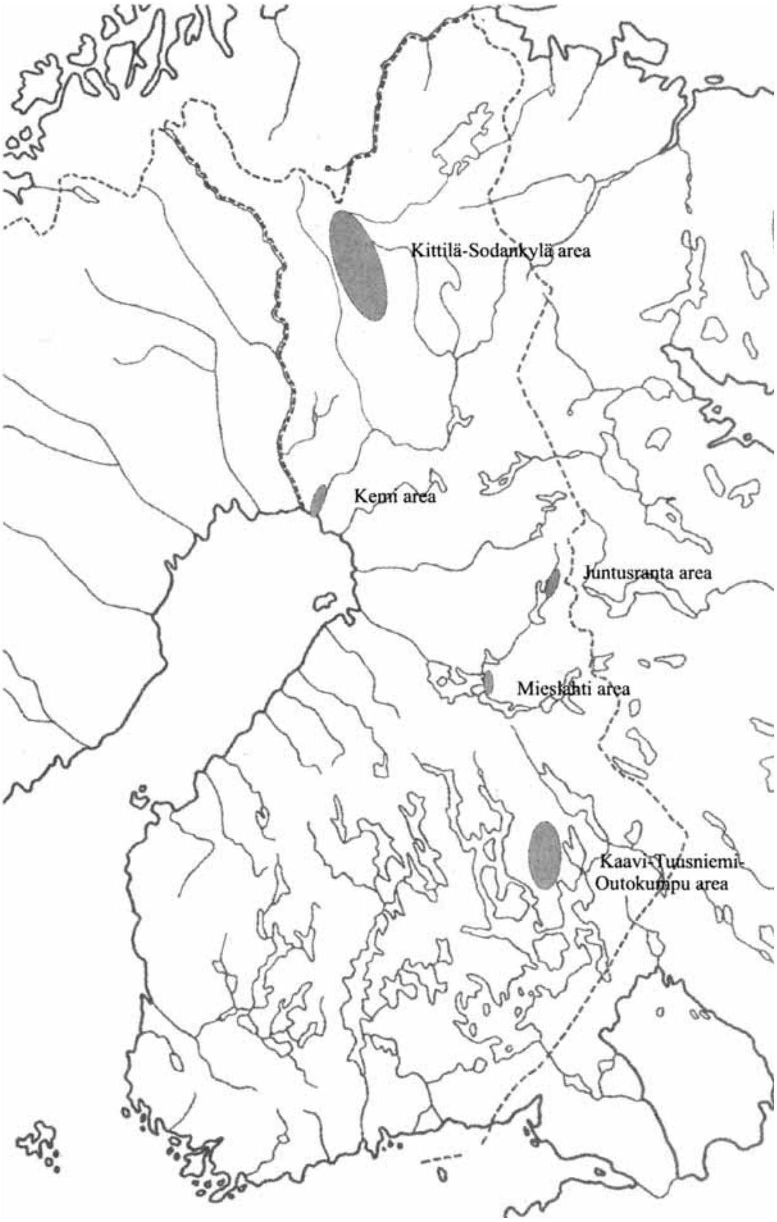

Figure 4. Asbestos sources in Finland (Lavento 2001: 49.)

found in association with greenstone and talc, while chrysotile is associated with soapstone (Andreassen 2002: 55). As all of the three associated types were commonly used in the Neolithic and Early Metal Period, it is likely that many smaller asbestos sources would have been known by local communities.

The three asbestos types act and look rather differently when crushed. The actinolite asbestos will be green with short, powderlike fibres, while the anthophyllite asbestos is light brown with long fibres. Chrysotile asbestos creates more cotton-like structures (Sundqvist 2000: 53).

5.2. Asbestos tempering in northern Fennoscandia

The following summary of the use of asbestos temper in Finland is largely based on Lavento and Hornytzkyl (1996). The first use of asbestos for temper in Fennoscandia is found in what is called ‘Early Asbestos pottery’ (Carpelan 1978), which dates back to ca 4500 calBC (Pesonen 1996: 28). The main area for this early use of asbestos was in eastern Finland, but with some finds also to the northwest (Carpelan 1978: 12; for distributions see also Pesonen 1999). There was little use of asbestos in the following widespread Typical Comb Ware. In contrast, the late Neolithic Kierikki and Pöljä wares were typically tempered with asbestos. Both of these had an easterly distribution, but with finds spreading northwest. At the transition to the Early Metal Period the use of asbestos temper appears to cease in eastern Finland, with the exception of a more limited area close to the asbestos sources (Lavento pers.com.). Asbestos was, however, used in northern parts of Finland and into Norwegian Finnmark and the Kola peninsula in the Lovozero ware. In Finnmark and Kola, asbestos was also used in the so-called Pasvik ware (Jørgensen & Olsen 1987). Asbestos was only used to a very limited extent in the various types of Textile ware in Finland in the 2nd millennium calBC (Lavento 2001: 47), but was the dominant temper in contemporary Norwegian and Swedish Textile wares (Jørgensen & Olsen 1987; Hulthén 1991). In the later part of the Early Metal Period, asbestos continued to be favoured in Norway and Sweden and was reintroduced in a number of Finnish wares, notably Kjelmøy ware with a northern Finnish distribution, and Luukonsaari and Sirnihta wares with eastern distributions (Lavento 2001: 115–16).

Different types of asbestos were used in different regions. In Finland, most examined vessels were tempered with anthophyllite asbestos (Lavento & Hornytzkyj 1996), although some use of actinolithic asbestos occur as well. There is some indication that the eastern Finnish sources were of anthophyllite asbestos, while Karelian sources were actinolithic (Lavento & Hornytzkyj 1996: 60). A few sherds of Norwegian Kjelmøy ware from Virdnejavre contain actinolithic asbestos (Sundqvist 2000: 52), but chrysotile asbestos is also available locally. All examined Risvik pottery from Troms and Nordland was tempered with chrysotile (Andreassen 2002: 55), as were the Swedish sherds (Hulthén 1991). There is, however, some doubt as to the comparison of the results, as different methods of analysis were employed (Andreassen 2002: 56).

5.3. Material and demographic movements indicated by asbestos temper

The following is an outsider’s preliminary interpretation of the spread of asbestos tempering. It should be duly noted that I have no first-hand experience with the pottery in question, and that I base my narrative on only one element in the production sequence. A much more complex and reliable narrative should be based on more elements from the pottery as well as other data.

5.3.1. Neolithic pottery

Asbestos is first introduced in eastern parts of Finland ca 4500 calBC (Early Asbestos pottery). This may well be a local invention as suggested by Carpelan (Carpelan 1978: 12), and the highest concentration of asbestos tempered vessels is in the vicinity of the known asbestos sources in the Saimaa region (Pesonen 1999). According to the available analyses the asbestos used in finds northwest of the Saimaa region is also anthophyllite, suggesting that the temper comes from Saimaa sources, as the Kainuu-sources are of a different kind (Lavento & Hornytzkyj 1996: 57, 63). Early Comb Ware is partly contemporary with this Early Asbestos pottery, with the main distribution south and west of the Saimaa area. Here asbestos is not used, although some overlap between the two wares and tempers are found in northern Ostrobothnia.

The usual temper in Typical and Late Comb Ware (ca 4000–3400 calBC; for the most updated C14 dates see Pesonen 2004) is sand and crushed stone, but in the Saimaa region there are some examples of the use of asbestos, although not crushed as before, but broken into pieces (Carpelan 1978: 13). In the latter half of the 4th millennium calBC asbestos is used in Kierrikki and Pöljä wares (the latter dating from the last half of 4th millennium calBC and most of 3rd millennium calBC). Kierikki ware has a marked concentration in the Saimaa region in eastern Finland, in addition to finds further northwest, notably around Kierikki itself. Pöljä ware has a very similar distribution, but with an increasing number of finds to the west and north.

The present data has a number of shortcomings: the available distribution maps are made according to ceramic styles, not tempers; there are only limited analyses of the kinds of asbestos tempers used and the possible sources for these. Based on the data as it stands today we may suggest that the first use of asbestos for temper most likely was a local innovation in Eastern Finland, where the asbestos was readily available. The innovation spread predominantly between neighbouring communities. This need not have been a result of permanent residential moves, but could have resulted simply from transmission of information between potters meeting at social gatherings. The finds further away, however, indicate an exchange network involving asbestos, assuming that only the Saimaa sources were used. The wish to employ asbestos in areas distant from its sources may have several explanations, that all entail close and positive contacts to the Saimaa region. The use of asbestos in the northwest may have been introduced and maintained by potters moving into the area from the Saimaa region, e.g. due to residential moves after marriage. If potters had learned to use asbestos, they may have preferred to continue that practice, even after moving away, i.e. we are predominantly dealing with vertical transmission. Obtaining the temper from their social network back in Saimaa would not have been difficult. If permanent demographic movements were rare, then the use of this specific temper still indicates a very positive association between the communities in Saimaa and to the northwest, partly on behalf of the potters in the northwest wishing to copy a practice, partly on behalf of the Saimaa residents, who must have agreed to supply the asbestos or access to the source. Some more distant and isolated finds may be the result of exchange of pots or their contents, or long distance journeys to communities with whom interaction was more sporadic. The particular geographical spread towards the northwest and to a lesser extent south, but not directly west, is undoubtedly linked to the directions of the water systems and regional mobility patterns.

Based on the most recent 14C dates, the use of asbestos decreases for some centuries when Typical Comb Ware is at its height. Then asbestos again becomes a prominent temper in Kierikki and Pöljä wares in the Saimaa region as well as to the northwest. Anthophyllite asbestos still dominates the analysed sherds. The geographical distribution and the possible explanations of spread and contact are much the same as in the earlier period. It is possible, however, that other asbestos sources came into use. The increase of finds along the River Kemijoki may suggest use of the sources at the river mouth, and some use of actinolite asbestos also indicates that temper was obtained from several sources, perhaps including Karelia (Lavento & Hornytzkuj 1996: 57). It is therefore possible that the networks became more complex, with slightly less focus on the links to Saimaa.

5.3.2. Early Metal Period

During the next phase there are two major developments. The use of asbestos temper practically ceased in the Saimaa region, while the pottery production spread north and east, and predominantly involved asbestos temper. The first expansion of the craft was into Finnish Lapland and adjacent areas of Norway and Russia. Lovozero pottery had a markedly northern distribution with finds in Kainuu, Lapland, Norwegian Finnmark as well as Karelia and the Kola Peninsula. Pasvik pottery was another contemporary northern type. They were both tempered with asbestos. The slightly later Textile ware, however, was found across the entire region of Northern Fennoscandia, representing a wider expansion of the technology. The variation in temper in the Early Metal Period, specifically in Textile pottery, covers almost all used tempers throughout Finnish prehistory (Lavento 2001: 47). However, Textile wares in Finland were only seldom tempered with asbestos. The known cases are either from eastern Finland, i.e. apparently a continuation of past traditions, or from Kainuu or Lapland (Lavento & Hornytzkyj 1996: 60). The Textile wares in Norway and Sweden, on the other hand, were almost exclusively tempered with asbestos. There is every reason to believe that new local sources for asbestos were used. The large amounts of Pasvik type pottery at Virdnejavre 112 (Olsen 1994: 122) close to an asbestos source would suggest this.

For the ceramic technology to spread into new areas some transmission of knowledge had to take place. The first expansion took the craft northwards from Kemijoki into northern Lapland and Norwegian Finnmark. It is in theory possible that individuals from the north learned the craft while visiting further south, but it is perhaps more likely that the knowledge was a result of residential moves, i.e. individuals or groups moving into the northern region. This need not have been a new phenomenon. There is every reason to believe that contacts existed between northern and southern region also in the Neolithic. If, however, as is usually argued for the period, new settlement patterns involving greater mobility over longer distances were established at the transition to the Early Metal Period, this may have intensified interaction. It is also possible that new areas were settled by groups from the south. It is noticeable that in Norway the Pasvik-pottery was more or less restricted to the Pasvik and Alta-Kautokeino water system. The Lovozero ceramics were also found on several sites in Pasvik, and then more sporadically along the coast of Finnmark (Jørgensen & Olsen 1987; Olsen 1994: 130). The earliest pottery was, in other words, restricted to a few local areas, which again may indicate some demographic movement northwards to selected areas. There is, on the other hand, no indication of any massive immigration.

In southern parts of Finland a wide variety of wares were produced from the late Neolithic onwards. This diversity continues in the Early Metal Period. Of particular interest here are the Textile wares. In Finland, these were tempered with a variety of materials, but rarely asbestos. The almost complete abandonment of asbestos tempering in a technological environment that seemed to accept almost any kind of temper is peculiar. The phenomenon certainly does suggest that the networks that supported the use and distribution of asbestos in the eastern region (marriage and exchange networks) broke down, possibly due to a reorientation in allegiances.

The textile impressions found on some of the pottery within the category Textile ware was a common feature across a wide region from the Urals to the Baltic Sea and beyond. It has been suggested that this stylistic phenomenon was part of a Textile ceramic culture that emerged in the east and spread towards the northwest (Carpelan 1978: 16; 2006: 80).

Does this suggest major immigration from the east? On the one hand it should be remembered that such décor may be copied and spread without much long term direct interaction or major demographic movement (see also Lavento 2001: 176). In addition it may be possible to see influences, as in copying of traits (horizontal transmission), from several directions. In the western area, textile impressions are known already in the Neolithic, notably on Corded Ware pottery in Estonia as well as in Finland, and it is very common in Kiukainen pottery, immediately preceding Textile wares (Lavento 2000). The western Sarsa subgroup of Textile ware may therefore be linked to late Neolithic Finnish pottery (Lavento 2001: 166; 2005: 764). An alternative hypothesis to a more unilinear westward spread is consequently that the different subgroups of Textile pottery (Sarsa, Tomitsa and the Kainuu group) developed quite differently, some from more local knowledge and tradition without any necessary new craftspersons, others due to some incoming groups or individuals (Lavento 2001: 177). A general preference for textile impression cut across these groups, suggesting positive associations between groups, but not necessarily much demographic mobility.

When the Textile ware spread further north and west, into Norway and Sweden, the vessels were predominantly tempered with asbestos. This may suggest that the transmission of knowledge (learning networks) was now linked to networks within the northern and western regions, where the employment of asbestos was continued. On the other hand, the copying of the textile decoration indicated positive associations with communities further east (as emphasized by Jørgensen and Olsen 1987). The continuation of asbestos tempering and the variations in décor patterns (indicating the use of different types of tools for decorations) suggest that this was a case of horizontal inter-communal transmission, mostly likely copying of décor and vessel shape, rather than the result of any distinctive demographic movement, contrary to the spread of Lovozero and Pasvik wares.

6. Conclusion

Abandoning large cultural entities, be they archaeological cultures or stylistic types, and instead focussing on studies of technological elements and their transmission within various types of networks may provide a more reliable foundation for discussion the intensity of interaction. I hope to have demonstrated that rather than linking a particular type of pottery such as Asbestos pottery or Textile ware to homogeneous cultural (and by implication linguistic) entities and demographic migrations, the spread of elements such as asbestos tempering or textile impressions may be connected to several different types of transmission within and between communities. It may also potentially improve the possibilities for discussing linguistic diversification and change. This approach enables us to discuss the extent to which certain similarities may have necessitated demographic mobility and certain other similarities may have been a result of emulation and copying only. In other words, I find the attempt to understand interaction between communities through a detailed analysis of the *chaîne opératoire* a promising exercise.

In this very preliminary study the focus was on one element only. This, of course, limits the analysis severely. More detailed studies of other elements (vessel building techniques, vessel shape, details in tools for decoration, decorative schemes) would add greatly to the understanding of the social dynamics and interactions taking place. The assumption here is that not all of these elements would show the same patterns: some would be restricted to vertical transmission with more limited geographical distributions, other elements may be linked to horizontal transmission and therefore would be more widespread.

In order to be able to proceed with such analyses more studies focussing on specific parts of the pottery production sequences is needed, studies along the lines put forward by Lavento & Hornytzkyj (1996) with determination of tempers, and by Pesonen (2004) where temper and other technological elements are studied separately.

Acknowledgements

This paper is an output of the international research project 'Early Networking in Northern Fennoscandia' which was hosted by the Centre for Advanced Study at the Norwegian Academy of Science and Letters, Oslo, during the 2008–09 academic year. My CAS-colleagues Lars Forsberg, Mika Lavento, Fredrik Hallgren, and Marianne Skandfer have kindly contributed with input and updates on data, theories and consistency; an anonymous reviewer provided constructive comments for which I am grateful. All inaccuracies and generalisations remain my responsibility.

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An essay on Saami ethnolinguistic prehistory[*]

> *"Sámiid boahtimušas ii leat gullon,*
> *ahte livččo boahtán gosge."*
> – Johan Turi

This essay deals with the study of the ethnolinguistic past of the Saami. In recent years many novel findings have emerged in the field of Saami historical linguistics, and the interpretation of these new results allows a coherent timeline of the development of the Saami languages to be established. The Proto-Saami language appears to have first evolved somewhere in the Lakeland of southern Finland and Karelia in the Early Iron Age. A broad body of evidence points to the conclusion that the Middle Iron Age (ca. 300–800 AD) in Lapland has been a period of radical ethnic, social, and linguistic change: in this period the Proto-Saami language spread to the area from the south and Saami ethnicities formed. Prior to this, Lapland was inhabited by people of unknown ethnicity that spoke non-Uralic languages, many relics of which survive in Saami vocabulary and place-names. In the archaeological record of Lapland the Middle Iron Age is an obscure period characterized by sparse finds and lack of ceramics and iron production. This apparent correlation between 'archaeological invisibility' and major ethnolinguistic change poses intriguing questions regarding the nature of this period of Saami prehistory.

1. Introduction

Since the very beginning of scientific study of the history of the Saami, scholars have wondered about our "origin" – whence we came and why we speak Finno-Ugric languages related to Finnish and Hungarian. Initially the question of our origins was approached from two very different angles. On the one hand, comparative linguists turned to seek these origins from beyond the Volga or the Urals, as the linguistic relationship of Saami languages to Finno-Ugric was solidly demonstrated in the 18th century already. On the other hand, cultural and physical anthropologists started early on to emphasize the difference of our ethos and race from those of neighboring peoples, including the linguistically

A Linguistic Map of Prehistoric Northern Europe.
Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 63–117.

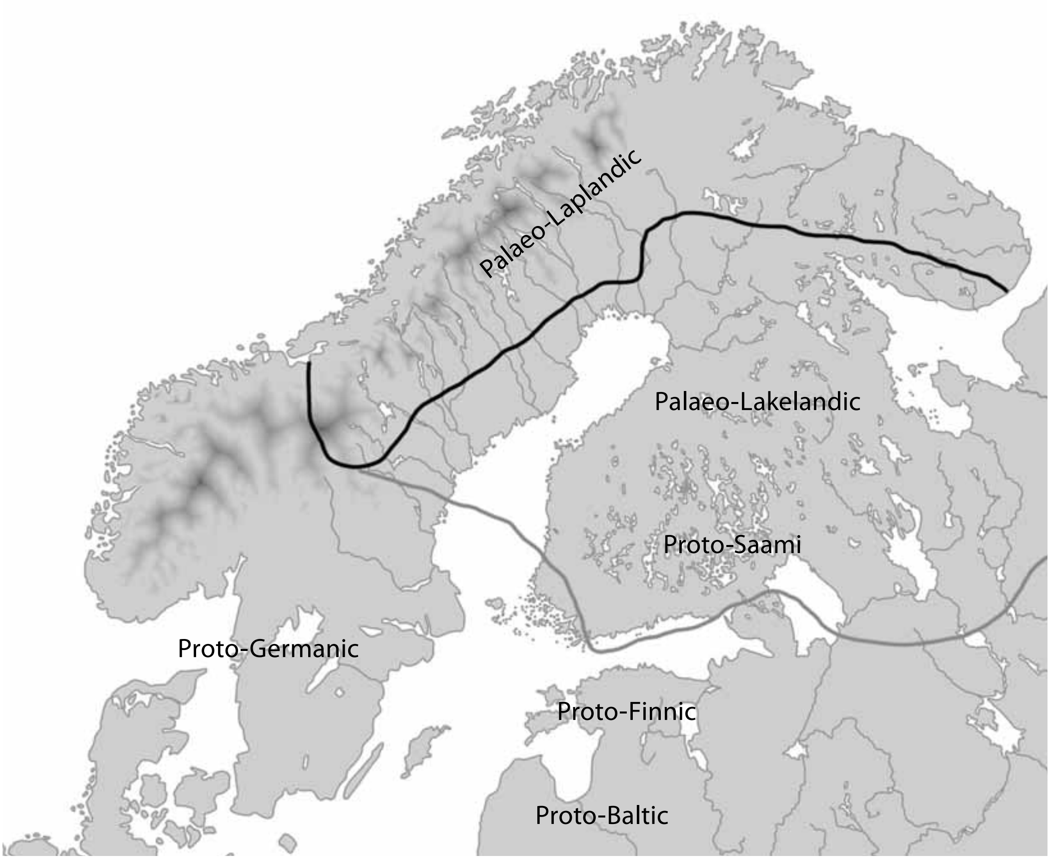


Figure 1. The linguistic situation in Lapland and the northern Baltic Sea Area in the Early Iron Age prior to the expansion of Saami languages; the locations of the language groups are schematic. The black line indicates the distribution of Saami languages in the 19th century, and the gray line their approximate maximal distribution before the expansion of Finnic.

related Finns. As such speculations combined with social Darwinist ideologies, it emerged as a mystery to be pondered by many scholars how we could be linguistically related to sedentary Finno-Ugric peoples that had evolved to a higher cultural level, even though our racial characteristics suggested a very different history – or perhaps a lack of history altogether.

The naïveté of such thoughts is now easy to point out. What is less easy to see, though, is how the legacy of old paradigms now manifests itself in new forms in today's theories. The clash between linguistic and anthropological findings of Saami origins has not disappeared, even though methods of population genetics have been substituted for craniometric measurements. While linguists trace Saami origins via the Finno-Ugric connection far to the Russian taiga, archaeologists find evidence of cultural continuity in Lapland since the pioneers who followed the receding ice sheet, and geneticists describe the Saami population as an 'outlier' in the European context. A synthetic view of Saami ethnogenesis seems perhaps farther from our reach than ever, as there is hardly a single question in the field of Saami prehistory on which broad agreement between scholars in the various disciplines could be found. Perhaps nowhere can this be seen better than in the fact that there is no unanimity of what the term 'Saami' even means when applied in a prehistoric context. This essay is an attempt to present a synthetic view in a fragmented field of study by piecing together a picture of what we currently do know and what we still do not know of the origin of Saami ethnicities.

Comparative linguistics provides effective methods for tracing the origins of languages, and due to the ethnolinguistic connection linguists have often dominated discussions on ethnic prehistory. Indeed, it cannot be denied that language is an important component of ethnic identity – it is, in fact, a component so central that ethnic boundaries largely coincide with linguistic ones. There are, of course, also many exceptions to this basic correlation, such as cases where two groups of people do not share a common ethnic identity in spite of speaking essentially the same language (as in the case of the Serbs and the Croats in modern Europe, for example). However, such cases are recognized as exceptional precisely because they go against the seemingly common rule that speakers of one language tend to consider themselves as members of one group, and those that speak another members of a different group.

The fact that a pervasive connection between language and ethnicity can be synchronically observed in the real world has given rise to an idea that this connection is also diachronically straightforward. It seems to be an unstated premise that lurks on the background of many linguists' thinking that the origin of a language also coincides with the ethnogenesis of its speakers. This has also been the case with my own writings on the topic, such as Aikio (2006), where the ethnically loaded term 'Saami homeland' is used in a purely linguistic sense, in reference to 'the original speaking area of Proto-Saami'. This way of thinking must be rejected as misleading, however.

It is, in fact, quite easy to see that ethnogenesis is not a direct result of the formation of new languages through the breaking up of a proto-language. For example, an ethnic category such as 'Swedes' has not emerged through the separation of a 'Swedish' language from Proto-Scandinavian. On the contrary, the mere idea of such a distinct 'language' has served as a background upon which the idea of an ethnic group could be created. But language does not need to determine the boundaries of an ethnic group even if it determines its prototype. By the linguistic criteria of shared innovations or mutual intelligibility one cannot find anything that would delimit all dialects of 'Swedish' as a coherent whole distinct from 'Norwegian' and 'Danish'. On the other hand, there are Scandinavian language varieties spoken within Sweden such as Övdalian, which by the criterion of lack of mutual intelligibility as well as by their speakers' own opinion are clearly distinct languages (although refused to be officially recognized as such by the state of Sweden). Still, speakers of Övdalian consider themselves 'Swedes' and not a distinct ethnic group (Melerska 2010). Moreover, even groups speaking linguistically unrelated languages, such as Meänkieli or Torne Valley Finnish in northern Sweden, have become secondarily incorporated to the ethnic category of 'Swedes'.

Hence, even if ‘ethnic identity’ is a category intimately tied to the concept of ‘native language’, ethnogenesis often cannot be explained as a direct result of glottogenesis – in part because there are many answers to how one should define ‘native language’ on an individual level (Skutnabb-Kangas 2000: 105–115) and to what counts as a ‘language’ on a group level. On the other hand, one should not go as far as to reject linguistic explanations of ethnogenesis altogether. While linguists have often oversimplified the connections of language and ethnicity, in other subfields of the humanities the situation is more the opposite – in cultural studies ethnicity has remained a highly controversial topic subject to much critical discussion and overproblematization, and the role of native language as a criterion of ethnic identity has often been overlooked in this discourse.

A popular view expressed by Barth (1969), for instance, is that ethnicity is a construct created or chosen to uphold a group’s difference from its neighbors. In the context of Saami prehistory Barth’s views have led scholars such as Odner (1983) and Hansen and Olsen (2004) to see the Saami ethnogenesis as a process of gradual unification, which could be explained as a reaction to the political, economic, and cultural pressure caused by intensified interaction with Scandinavians in the Iron Age. While there is certainly a grain of truth to such a scenario, the theory still reminds one of a three-legged stool missing a leg. As languages are born through a process of linguistic diversification, no completely new language could ever have been ‘created’ as an ethnic marker in response to outside pressure. Even if the envisioned process of ethnic unification has taken place in Lapland – and it well may have – we still need a wholly different explanation to how the Proto-Saami language became adopted as a key component of the emergent ‘Saami’ identities.

The intimate connection between language and ethnicity implies several things for the interpretation of Saami prehistory. It is worth bearing in mind that the term ‘Saami’ can be reasonably applied only to societies thought to have used some form of Saami as their main medium of in-group communication. Because of this, it is sensible to speak of ‘Saami people’ and ‘Saami culture’ only in connection with periods when Saami languages have existed, but not before that. Even so, it must also be borne in mind that ‘Saami’ in this sense is merely a linguistic umbrella term, and we must seriously consider the possibility that in prehistoric times Saami languages have been spoken in communities that differed radically from the historical Saami in terms of their culture, livelihoods, or ethnic identity.

While all this might seem easy to fathom, in practice one gets to learn that it is not. For instance, it is not at all uncommon to see Stone Age dwelling sites or rock art in Lapland characterized as “Saami” in scholarly references and popular texts alike. Even so, those acquainted with very basic facts of the historical development of languages are aware that the Saami languages – or indeed, any languages spoken today – cannot possibly have existed in the Stone Age. Consequently, there can have been no ‘Saami’ in the Stone Age either; people who did not speak Saami and did not call themselves Saami should not be called Saami by us either. It is another thing that the Saami, like all peoples, have their Stone Age linguistic, cultural, and genetic ancestors. Thus, the right question to ask is how Saami ethnicities later emerged through the interplay of diverse linguistic, cultural, and genetic components. In the present state of research the details of this process are largely unknown.

While our current knowledge will hardly translate into an exact theory of Saami ethnogenesis, it is a task in itself to try to create a synthesis of what we know and to formulate the questions we should ask ourselves next. The last decade has produced many new results and interpretations in the field of Saami historical linguistics, and a rather uniform view of the chronology and areal contacts of the proto-stages of Saami languages has emerged among linguists (Aikio 2006; Kallio 2009; Häkkinen 2010a, 2010b; Saarikivi 2011; Heikkilä 2011). These new linguistic views are of interest to scholars in all fields of Saami prehistory, as they allow us to place sociolinguistic events of the past in space and time, and thus to partially reconstruct the sequence of major 'speech community events' (in the sense of Ross 1997) which led from the Uralic proto-language to the emergence of Saami languages in Lapland.

Somewhere along this timeline of linguistic development Saami ethnicities have taken shape in the groups speaking these languages. The setting up of a linguistic chronology for Saami will thus also allow us to determine the boundaries between possible and impossible theories of Saami ethnogenesis. It would seem a reasonable requirement for such a theory that it must address the question why the Saami people speak Saami languages, as even the name 'Saami' as a label for an ethnic category is tied to the very existence of the languages themselves. I shall discuss below results achieved on various questions in Saami historical linguistics, focusing largely on loanword strata of varying age, which bear witness to the prehistoric interactions of groups speaking different languages. An attempt for a synthesis of these results will prompt us with new and surprising questions about past ethnicities in Lapland.

2. The position of Saami in the Uralic language family

The Saami languages, occupying the extreme northwestern parts of continental Europe, are a geographically peripheral branch in the Uralic family of languages. Whatever theory of Uralic *Urheimat* one might choose to endorse, it is quite obvious that the original speaking area of the Uralic proto-language must have been located far from Lapland, and certainly such an outlying area must have become Uralicized only in the last phase of the sequence of linguistic expansions that have formed the language family in the first place. It is, at any rate, clear that the first people to colonize Lapland after the last Ice Age were not speakers of Uralic languages, as the whole language family is hardly much older than approximately 4000 years (an up-to-date discussion on the dating of Proto-Uralic is provided by Kallio 2006).

Saami has a special relationship with Finnic, the only branch of the family known to have been in contact with Saami. In the traditional framework of Uralic taxonomy this special relationship has been understood in a genetic sense: Saami and Finnic languages would constitute a 'Finno-Saamic' subgroup in the family, and thus derive from an intermediate Finno-Saamic proto-language (which in older research has been misleadingly called ‘Early Proto-Finnic’). Even so, it has always been clear that the main bulk of features shared by Saami and Finnic are due to language contact rather than genetic inheritance. This is certainly true of many morphosyntactic isomorphisms, and also loanwords have been adopted from Finnic to Saami in huge numbers. Some scholars, notably T. Itkonen (1997), have pursued the idea that all the features common to Finnic and Saami and separating them from the rest of the Uralic family could be explained in this way. Itkonen’s conclusions have been criticized by Sammallahti (1999: 72–74), who points out that there is more vocabulary common to Finnic and Saami than Itkonen acknowledges, and also draws attention to specifically Finno-Saamic cognate grammatical endings such as the mood markers *-ŋśi- and *-kśi- and the infinitive ending *-tak.

How one should evaluate the arguments for and against a Finno-Saamic genetic subgrouping depends on what kinds of probative power one assigns to the various levels of language in taxonomical questions. As regards shared vocabulary items, it is difficult to see the evidence for Proto-Finno-Saamic as compelling; in methodological discussions it has been pointed out that shared vocabulary as such is a weak criterion for subgrouping, as lexical innovations can easily spread between dialects and languages already separated (e.g., Fox 1995: 220). In the case of Saami and Finnic the use of lexical evidence is further complicated by the existence of ‘etymological nativization’, a process whereby speakers bilingual in two related languages identify patterns of regular sound correspondence and then apply these productively by nativizing loanwords in shapes that accord with the sound correspondences attested in cognate vocabulary. Such processes have been very productive in the loanwords transferred between Finnic and Saami, and they have often made even recent borrowings deceptively look like cognate items from a phonological point of view (Aikio 2007a).

Keeping this in mind, one must treat with some doubt claims such as that Saami and Finnic may share as many as 220 cognate words not attested elsewhere in the Uralic family (Sammallahti 1999: 74), as many or even most of such word-roots may simply be undetected borrowings between the already differentiated language branches. On the other hand, T. Itkonen’s (1997) attempt to undermine the validity of the ‘Finno-Saamic’ subgrouping on the basis of calculations of the numbers of lexical cognates must be treated with the same doubt, as he, too, seems to overestimate the probative force of lexical correspondences in genetic subgrouping.

In the domain of morphology a few specifically Finno-Saamic cognate morphemes are well established. It is problematic, though, that their further origin remains unknown and none of them can be unambiguously shown to have arisen as a result of some specific innovation; it is possible that they were simply inherited from an earlier proto-language stage and their cognates in more eastern Uralic languages either were lost or remain unidentified. Phonology is the domain where more precise methods for detecting innovations could be applied, but interestingly, it has proved very difficult to find decisive evidence of sound changes common to Saami and Finnic.

The most plausible candidate for such a change is the development of a labial vowel in unstressed syllables via a change *Vw > *oj (Sammallahti 1999: 72–73). But as recently shown by Kuokkala (2012), closer inspection reveals the correspondences between Saami and Finnic unstressed labial vowels as highly diverse, which suggests more complicated paths of development. As proposed by E. Itkonen (1954) already, the Proto-Uralic sequences *-aw- and *-iw- seem to have developed differently in Finnic (as in Fi *kanto* 'tree stump' < Proto-Uralic *kïntaw vs. Fi *käly* < Proto-Uralic *käliw), whereas Saami shows no such distinction. If the unstressed labial vowels really are a common innovation instead of a parallel development, then two such vowels (*o and *u/*ü) need to be reconstructed in Proto-Finno-Saamic, which later merged in Saami (see also Kallio, forthcoming). Another problem is that Saami shows a distinction between an unstressed labial vowel (Proto-Saami *-ō ~ *-u-) and an unstressed sequence of a labial vowel followed by a palatal glide (Proto-Saami *-ōj ~ *-ujë-), both of which have the same correspondents in Finnic. How this is to be accounted for in terms of phonological reconstruction is not clear; the history of unstressed labial vowels requires further study.

The question whether Finno-Saamic is a valid genetic subgroup remains so far unsolved, and perhaps insoluble. The taxonomic issue is further complicated by the fact that also other Uralic languages have been spoken in the immediate vicinity of Finnic and Saami, but these became extinct during the expansion of East Slavic. Rahkonen (2011a) has convincingly argued on the basis of toponomastic studies that the Uralic language spoken by the 'Chudes' in areas surrounding the city of Novgorod was neither Finnic nor Saami. In the Early Middle Ages there still was an unbroken continuum of Uralic languages spoken by the historical Chude, Merya, Muroma and Meshchera tribes that linked Finnic and Saami to Mordvin. We know nearly nothing of the concrete features of these extinct languages, but there are speculative theories such as Rahkonen's (2009) attempt to link the Meshchera language in the Oka River basin with Permic on the basis of certain resemblances in place-names.

Questions regarding the taxonomic position of Finnic and Saami are obviously very difficult to answer as long as we lack knowledge of the features of the extinct Uralic languages once spoken in their vicinity. Nevertheless, due to the very limited number of possible common Finno-Saamic innovations it seems clear that if such an intermediate proto-language really existed, it must have been merely a short transitory period before the separation of Pre-Proto-Finnic and Pre-Proto-Saami into distinct speech communities. On the whole, though, the taxonomic validity of Finno-Saamic is perhaps not a question of central importance to the reconstruction of Saami linguistic prehistory; it is in any case clear that Finnic and Saami split off from a common parent language regardless of whether this proto-language was 'Finno-Saamic' or some more inclusive branching from which also some other West Uralic languages have diverged. On the other hand, it is equally clear that Pre-Proto-Finnic and Pre-Proto-Saami have developed in close geographic proximity, as otherwise they could not show the signs of prolonged language contact on all levels of language. Thus, while Finno-Saamic might not be a valid genetic grouping, it still is a valid areal grouping – in Helimski's (1982) terms an 'areal-genetic unit', i.e. a linguistic subgroup which has only limited evidence of status as genetic node but shows signs of extensive areal interaction. The status of Finno-Saamic as an areal-genetic unit is a fact that must have a specific historical explanation.

3. The areal context of Pre-Proto-Saami

Even though we do not know exactly how Pre-Proto-Saami separated from other early western Uralic languages, we can try to reconstruct its areal context soon after its emergence. Once Pre-Proto-Saami had become established as a distinct dialect or language spoken in its own speech community, its speakers have been in contact with neighboring groups speaking both genetically related and unrelated languages, and traces of these contacts can be recovered by the comparative method and etymological analysis.

Before we can review the evidence of interaction between Pre-Proto-Saami and other contemporaneous language forms, the term itself needs clarification. The path of linguistic innovations that led from Proto-Uralic to Proto-Saami consists of many subsequent periods of language change. The most conspicuous of these periods of change involved a complete reorganization of the Uralic vowel system, which serves as a useful criterion for differentiating a Proto-Saami stage of linguistic development from a Pre-Proto-Saami one.

West Uralic			Pre-Proto-Saami		Proto-Saami				
i	ü	u	i	u	ie	i		u	uo
e		o	e	o	ea		ë	o	oa
ä		a	ä	a			ā		

Table 1. West Uralic, Pre-Proto-Saami, and Proto-Saami vowel systems.[1]

As seen in Table 1, Pre-Proto-Saami had a conservative vowel system which only minimally differred from its ancestral West Uralic vowel system, from which also the Finnic and Mordvin languages derive. In Proto-Saami, however, the vowel system had developed into a radically different form through a process which can be called the 'Great Saami Vowel Shift' (cf. the 'Great Vowel Shift' that has taken place in English). A detailed description of the various substages of this process can be found in M. Korhonen (1981: 77–125) and Sammallahti (1998: 181–189).

This reorganization of the vowel system is notable in several respects. First, the development was a complex one, as it consists of a large number of individual sound changes of the shift, split, and split-merger type. Second, it was also radical in the sense that it resulted in a complete redistribution of the vowel space: no single vowel in the Pre-Proto-Saami system remained unaltered. Third, in terms of linguistic typology, the resulting Proto-Saami vowel system is a highly atypical one, especially in contrast to the unremarkable six-vowel system of Pre-Proto-Saami. That such a complex and idiosyncratic series of changes in pronunciation was completed with near 100% regularity implies that it took place in a relatively compact and tight-knit speech community. In other words, the language must have been spoken within a relatively limited geographical area until the Great Saami Vowel Shift was completed.

For the purposes of this paper Pre-Proto-Saami can be defined as the ancestral form of Saami languages that had already diverged from its Uralic sisters, including Finnic, but which had not yet undergone the Great Saami Vowel Shift. In practice, of course, the vowel shift consisted of various substages, and in detailed linguistic analyses one can make more fine-grained distinctions between various proto-stages of Saami, but these are hardly relevant for what will be argued below.

The usefulness of the Great Saami Vowel Shift for reconstructing Saami linguistic prehistory lies in the fact that it provides a rather good criterion for determining at which stage various loanwords have been adopted. Certain loanwords show the effects of this vowel shift and must thus have been present in Pre-Proto-Saami already, whereas others do not and must consequently have been adopted only after the shift. For example, in Germanic loanwords adopted before the vowel shift, we can see the development of Pre-Proto-Saami *a to Proto-Saami *uo, whereas in later loans from the same source a different reflex is found. This is illustrated by the following Lule Saami word duplets consisting of two temporally distinct borrowings of the same Germanic word:

Proto-Germanic (> Old Norse)	Pre-Proto-Saami loan	Proto-Saami loan
*wardō- (> *varða* 'guard')	*vuorddet* 'wait'	*várddahit* 'stare; look around'
*laigja- (> *leiga* 'rent')	*luojkkat* 'lend, borrow'	*lájggit* 'rent'
*langan (> *langi* 'one of the stomachs of cattle')	*luogge* 'rectum'	*(guobmo-)lággá* 'appendix'

Table 2. Temporally distinct Germanic loanword strata in Saami.

There are three source language groups from which loanwords are known to have penetrated into Pre-Proto-Saami in significant numbers: Baltic, Germanic, and Finnic. A notable problem for the analysis of Finnic loanwords is that they are notoriously difficult to stratify and date; it is often quite hard to find unambiguous criteria that would reveal whether a particular loan was adopted to Pre-Proto-Saami, Proto-Saami, or even later into the already differentiated Saami languages. In large part this is due to the phenomenon of 'etymological nativization' mentioned in the previous section and discussed in more detail in Aikio (2007a). Especially as regards vowels, even recent loans between Saami and Finnic have often been adapted to the regular sound correspondences displayed by shared Uralic vocabulary. This often makes it impossible to solve at which stage of language development the word was borrowed, and occasionally one even cannot determine whether the word was borrowed at all or inherited from a common parent language instead.

This is an unfortunate situation, as it renders the majority of etymological material essentially useless for the dating of Finnic-Saami loan contacts. However, it appears that the regular vowel correspondence Finnic *a* ~ Saami *uo* never became a model for etymological nativization (Aikio 2007a: 36), and hence it serves as a valid criterion for identifying Finnic loans that entered the language before the Great Saami Vowel Shift. The problem, then, is to distinguish loans showing this vowel correspondence from cognate items due to common inheritence, and this can only be done if the word shows a consonant correspondence that reveals it as a loan. Even though such a limitation rules out the vast majority of all possible sound combinations, at least two such etymologies can be found:

> **SaaN *buošši*** 'ill-tempered (of a woman)' < PSaa *puošē < Pre-PSaa *paša < Pre-PFi *paša (> PFi *paha > Fi *paha* 'bad, evil'). – The word must be a loan, as it displays the secondary Pre-PSaa sibilant *š; an inherited cognate of Fi *paha* would have undergone the change *š > *s and thus developed into the form ***buossi* in North Saami. The loan original must still have had the sibilant *š; the Finnic change *š > *h is even younger than the PSaa vowel shift *a > *uo, as revealed by the later loan SaaN *láš'ši* 'lean' (< PSaa *lāššē < Pre-PFi *laiša > Fi *laiha* 'lean').

> **SaaN *buolža*** 'moraine ridge' < PSaa *puolčë < Pre-PSaa *palći < Pre-PFi *palći (> PFi *palci > Fi *palsi* 'a hard layer of soil or clay, especially in the bottom of a lake'). – The word must be a loan, as it displays the Pre-PFi change *ti > *ći; the actual inherited cognate of the word is SaaL *buollda* 'mountain side' (< *palti).

These etymologies are important as they reveal the existence of loan contacts between Pre-Proto-Saami and Pre-Proto-Finnic. The fact that we can find even two examples of such loans by applying highly exclusive phonological arguments implies that in reality many words must have been borrowed in the same period; usually there just are no criteria for determining whether a particular loanword dates back to this stage.

It is much more illuminating to analyze loans adopted to Pre-Proto-Saami from genetically unrelated contact languages, in particular Baltic and Germanic which are known to have extensively contributed to the lexica of Saami and Finnic languages over long periods of time. The oldest strata of Baltic and Germanic loanwords in Saami are superficially similar in that both are to some extent shared with Finnic, and that Finnic possesses more old borrowings from these sources than Saami does.

The fact that Saami partially shares its oldest Baltic and Germanic loans with Finnic, showing a much stronger influence from these languages, has given rise to the idea that the oldest loans from these sources were not in fact adopted to Saami independently but spread there via Finnic. This was suggested already by Vilhelm Thomsen (1869), the pioneer of Germanic and Baltic loanword studies.

Recently a somewhat similar stance has been cautiosly supported by Kallio (2009: 34, 36), who notes the possibility that the majority of Proto-Baltic and the oldest Proto-Germanic loans in Saami were mediated by Pre-Proto-Finnic. On the other hand, Koivulehto (1988; 1999) has emphasized that Pre-Proto-Saami appears to have adopted independent Germanic borrowings already at its earliest stages.

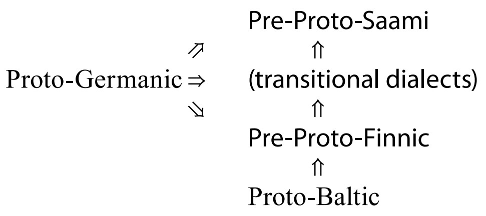
A closer inspection of the etymological material reveals a notable difference between the distributions of Baltic and Germanic loans. If we exclude borrowings which were certainly or at least very probably mediated by Finnic, there seem to be 32 old Baltic loanwords in Saami.[2] A conspicuous feature of the material is that nearly all of these words have a cognate in Finnish; only eight words (*faggi*, *giehpa*, *johtit*, *leaibi*, *loggemuorra*, *riessat*, *vietka*, *saertie*) have a distribution limited to Saami. The number of Proto-Germanic loans is twice as high, 63 words.[3] Of these slightly over a third, 23 words, have a possible cognate in Finnic; even in many of these cases there is evidence suggesting that Finnic item was separately borrowed (Aikio 2006: 10–13, 39).

Thus, we have three independent findings regarding loanword stratification:

a) Pre-Proto-Saami had adopted loanwords from Pre-Proto-Finnic
b) Pre-Proto-Saami had a stratum of Proto-Baltic loanwords that was for the most part shared with Pre-Proto-Finnic
c) Pre-Proto-Saami had a stratum of Proto-Germanic loanwords that was for the most part not shared with Pre-Proto-Finnic

These results can be interpreted in several ways. One possible scenario is that the Baltic loanwords are on average older than the Germanic ones, and were adopted into a 'Finno-Saamic' proto-language before its separation to Pre-Proto-Finnic and Pre-Proto-Saami; at the same time, some Germanic loans were also adopted. After the language split, then, the Baltic contacts of Pre-Proto-Saami would have ceased whereas the Germanic contacts would have become more intensive. Pre-Proto-Finnic would have continued to develop under heavy influence of both Baltic and Germanic, which is reflected as a significantly larger number of old Germanic and Baltic loans in the Finnic languages.

While such a scenario is in itself possible, the problem is that we do not really have clear taxonomic evidence for the reality of a distinct 'Finno-Saamic' proto-language. Hence, invoking such a proto-language to explain the distributional peculiarities of Germanic and Baltic loans smacks of circular reasoning. If one presumes instead that the Finno-Saamic areal-genetic unit was a dialect continuum, one can posit the hypothesis that the different distributional profiles of Proto-Baltic and Proto-Germanic loans reflect not two periods of borrowing, but instead two different geographical positions of the source languages in relation to Pre-Proto-Finnic and Pre-Proto-Saami; as regards Germanic borrowings, this conclusion has been drawn by Koivulehto (1999). As argued in Aikio (2006: 45), the following picture suggests itself; the arrows indicate major pathways of loanword adoption:



Thus, it seems likely that ‘Finno-Saamic’ was a dialect continuum instead of a proto-language, and that different speech communities within this continuum had different geographic patterns of interaction with outside groups. Both the speakers of Pre-Proto-Saami and Pre-Proto-Finnic have been in independent contact with Germanic speakers, even though a part of the loanwords have diffused between the dialects and eventually become a part of both Finnic and Saami lexicon. On the other hand, only the speakers of Pre-Proto-Finnic dialects had any significant contacts with Baltic-speaking groups, and the Baltic loans found in Saami have secondarily diffused through the dialect continuum. Such an account explains why nearly all Baltic loans in Saami are shared with Finnic.

Against this interpretation one might say that there are, after all, a few Baltic loans in Saami that do not have a cognate in Finnish (Koivulehto 1992a). Their number is, however, only a quarter of all loans, 8 out 32 cases.[4] Thinking statistically, such a fraction does not serve as proof of any independent contacts between Pre-Proto-Saami and Baltic, because it cannot be assumed that Finnish would have retained 100% of the vocabulary of Pre-Proto-Finnic. It is predictable that there also are some Baltic loans which were mediated via Pre-Proto-Finnic to Pre-Proto-Saami, but later disappeared in Finnic itself. The figures imply a survival rate of roughly 75% in Finnish for loans from this period, which actually seems rather high.

One must note, though, that there also appear to be three Baltic loans in Saami which lack a cognate in Finnic and which, for phonological reasons, could not even in theory go back to a common Finno-Saamic proto-form as they display the secondary Proto-Saami sibilant *š: SaaN *šielbmá* ‘threshold’, *šear’rát* ‘shine brightly’ and *šuvon* ‘good dog’ (Sammallahti 1999: 79; Aikio 2009: 199–200; Kallio 2009: 35). However, even in these cases one cannot prove that they were not at a somewhat later stage borrowed from Pre-Proto-Finnic forms which subsequently became lost in Finnic.[5]

In the case of one word such an argument runs into difficulties, however. The word for ‘alder’ has apparently been borrowed from Baltic in two different phonological shapes: Pre-Proto-Saami *lejpä (> SaaN *leaibi* ‘alder’) vs. Pre-Proto-Finnic *leppä (> Fi *leppä* ‘alder’).[6] In this case the diffusion hypothesis is perhaps excluded due to the distinct shapes in Finnic and Saami. However, it would be daring to draw far-reaching conclusions on the basis of one etymology only. Even if the word for ‘alder’ is a relic of direct interaction between Pre-Proto-Saami and Proto-Baltic speakers, the scarcity of the etymological evidence suggests that these contacts have been of mere minor significance. It is still clear that Pre-Proto-Saami remained outside the sphere of any major Baltic influence, which starkly contrasts with the evidence of the heavy impact of Baltic on Pre-Proto-Finnic.

Recently Häkkinen (2010b) has proposed the following prehistoric interpretation of the Proto-Baltic and Proto-Germanic loanwords in Saami:

> "Since the end of the Bronze Age or the beginning of the Iron Age the contacts between Saami and Germanic have intensified, whereas the contacts between Saami and Baltic have decreased in the Iron Age, which in terms of geography can be interpreted so that the Early and Mid-Proto-Saami-speaking area ended up closer and closer to the sphere of Germanic influence or even geographically spread or moved towards it, and on the other hand the speaking area of Finnic may have expanded to cut off the direct contacts between Saami and Baltic." (Häkkinen 2010b: 57; translated from Finnish.)

Our interpretation obviously turns out to be different, if we accept the conclusion that there never even was significant direct contact between Baltic and Pre-Proto-Saami speakers in the first place. In that case it is unnecessary to postulate any major changes in the speaking areas of proto-languages at this stage. We can instead assume that nearly all of even the oldest Baltic loanwords in Pre-Proto-Saami were adopted via Pre-Proto-Finnic, but the difference between the sound systems of these dialects was still so small at that point that we cannot tell these loanwords apart from cognate items by phonological criteria.

Therefore, it would appear that the contacts between Saami and Baltic never ceased because they never even really began. Baltic loanwords have diffused to the Saami part of Finno-Saamic at many periods, often significantly later than the Finnic word itself was originally borrowed from Baltic. The older the diffusion the more archaic are the phonological features the Saami word exhibits, and the oldest diffused words cannot be told apart from true cognate items. On the basis of the reflexes of Baltic *š, for instance, we can distinguish between three stages of borrowing:

1. The earliest loans show the change *š > *s in Pre-Proto-Saami (e.g. SaaN *suoidni* ~ Fi *heinä* 'hay' < *šajna, cf. Lithuanian *šienas* 'hay').
2. Younger loans were borrowed after the introduction of secondary *š in Pre-Proto-Saami, but before the Finnic change *š > *h (e.g. SaaI *šišne* 'tanned leather' < Pre-PFi *šišna > Fi *hihna* 'leather strap'; cf. Lithuanian *šikšna* 'tanned leather').
3. The most recent borrowings reflect Finnic *h* < *š (e.g. SaaN *heaibmu* 'tribe' < Fi *heimo* < Pre-PFi *šaimo, cf. Lithuanian *šeima* 'family').

In addition to Proto-Baltic and Proto-Germanic loans, it has been proposed that even earlier Indo-European loans were independently borrowed into Pre-Proto-Saami; these would stem from 'Northwest Indo-European', an early predecessor of Germanic and Balto-Slavic languages (Koivulehto 2001). If this interpretation is correct, it implies that the dialectal differentiation between Pre-Proto-Saami and Pre-Proto-Finnic has very deep roots. There are reasons for uncertainty, however. The hypothesis is based on a rather small number of etymologies; according to Sammallahti (2011: 209) there are fifteen such independent loans in Saami. As there are many more ancient Indo-European loans that Saami shares with Finnic or other West Uralic languages, at least a part of the fifteen cases can certainly be explained as words whose cognates have become lost elsewhere.

4. Proto-Scandinavian loanwords and the dating of Proto-Saami

As the Pre-Proto-Saami language transformed into Proto-Saami, its contacts with Germanic language varieties seem to have intensified. There is a very extensive stratum of loanwords adopted from Proto-Scandinavian to Saami, which provides an excellent basis for reconstructing the Saami-Scandinavian contact networks in this period.

The Proto-Scandinavian loans in Saami have a long research history, which in its early stages was characterized by a polarized debate on their very existence. Qvigstad (1893) initially wanted to deny that altogether, whereas Wiklund (1918) claimed their number was as high as 600. Later research revealed Qvigstad's original position as false and Wiklund's figure as greatly exaggerated. In his critical assessment of the phonological criteria for Proto-Scandinavian origin Sköld (1961) found it questionable whether even 200 loans could be shown to date back to the Proto-Scandinavian phase. Since Sköld's study there have been many advances in the field especially due to the extensive loanword research conducted by Koivulehto (e.g., 1992b; 1999). However, no up-to-date synthesis of the stratification of Scandinavian loanwords is available, and Sköld's (1961) monograph on the topic is outdated.

The study of Proto-Scandinavian loans is a rich source for Saami linguistic chronology, because Proto-Scandinavian, despite being a primarily reconstructed language, is also fragmentarily attested in the Early Runic inscriptions. Because many Scandinavian sound changes can be given absolute datings with the help of runic material, this allows us to provide absolute *terminus ante quem* datings for many loanwords in Saami. The forms of Proto-Scandinavian loans in Saami mostly seem to correspond to the phonology of the language attested in Early Runic roughly in the period 200–500 AD, and by 700 AD at the latest the Scandinavian language varieties had undergone remarkable sound changes (Nielsen 2000) after which many of the attested Saami forms could not have been borrowed. The analysis and more exact dating of individual sound changes and loanwords are naturally complicated issues.

Saami linguistic chronology can be correlated with the Scandinavian one by the help of loan etymologies which can be dated as Proto-Scandinavian and at the same time exhibit important Saami phonological innovations. The Proto-Scandinavian loanwords in West Saami languages show certain phonological features that are mostly absent in East Saami. Especially notable is the treatment of word-initial consonant clusters and the phoneme /f/, both of which were originally foreign to Saami. Both features occur throughout the West Saami area even in old loans deriving from Proto-Scandinavian. In individual words these features have often secondarily spread to Inari Saami and sometimes even to Skolt Saami via North Saami influence, but the easternmost languages Kildin and Ter Saami seem to have acquired initial consonant clusters and /f/ only very recently through borrowings from Russian. The following words serve as examples:

- SaaS *faaroe*, U *fárruo*, P *faarruo*, L *fárro*, N *fárru*, I *fááru* 'party, company (of travellers)', Sk *väärr*, K *vārr*, T *varr* 'trip, journey' (< PSaa *fārō ~ *vārō) < PScand *farō > ON *fǫr* 'journey'. – The Inari form with *f-* has been influenced by North Saami.
- SaaS *skaaltjoe*, U *skálttjuo*, L *sjkálltjo*, N *skálžu*, I *skálžu*, Sk *skälʒǯ* ~ dial. *kälʒǯ*, K *kāllǯ* 'seashell' (< PSaa *skālčō ~ *kālčō) < PScand *skaljō > ON *skel* 'shell'. – The Inari and Skolt forms with *sk-* have been influenced by North Saami.

It is worth the while to examine the distribution of these phonological features in those loans which can be dated as Proto-Scandinavian. The data are presented in Table 3; the actual etymologies in question are listed in an appendix to this paper. The material shows an interesting pattern. In all West Saami languages, forms with the consonant /f/ and initial clusters of the type *sC- are found. However, initial clusters of the type stop + liquid (*pl-*, *pr-*, *tr-*, *kl-*, *kr-*) show a narrower distribution, as they are confined to South, Ume, and Pite Saami.

It is clear that during the Proto-Scandinavian period Proto-Saami had already dialectally diversified, and that the dialects exhibited different patterns of loanword nativization. On the basis of nativization patterns in Scandinavian loans one can distinguish between three proto-dialects at this period:

- *The southwest dialect* (> South, Ume and probably also Pite Saami),[7] which had adopted:
    - word-initial consonant clusters of the type *sC-
    - word-initial consonant clusters of the type stop + liquid
    - the phoneme /f/
- *The northwest dialect* (> Lule and North Saami),[8] which had adopted:
    - word-initial consonant clusters of the type *sC-
    - the phoneme /f/
- *The east dialect* (> Inari, Kemi, Skolt, Akkala, Kildin, and Ter Saami), which had adopted none of these features.

In addition to the phonological differences, the table illustrates how the occurrence of Proto-Scandinavian loans is heavily concentrated in the West Saami area. In East Saami their number is smaller, and only few are found in Kildin and Ter Saami on the Kola Penisula. This also points to the conclusion that Proto-Saami was in fact a diffuse dialect continuum at the time of Proto-Scandinavian contacts, and that the loans were adopted in the West Saami area from which a part of them diffused further east via dialect borrowing.

We can, indeed, verify this interpretation by onomastic evidence. Along the Norwegian coast there are scattered Saami place-names which have been convincingly explained as loans from Proto-Scandinavian; the southernmost of

	S	U	L/Ö	P	L	N	I	Sk	K	T
*fiččō ‘flipper’	–	–	–	–	–	f-	v-	–	v-	v-
*fālēs ‘whale’	f-	f-	f-	f-	sv-	f-	v-	v-	v-	v-
*fiellō ‘board’	f-	f-	f-	f-	f-	f-	–	–	–	–
*fiervā ‘low tide’	f-	–	f-	f-	f-	f-	f-	v-	–	–
*lāffēs ‘flea’	-ff-	-hv-	-f-	-ff-	-ff-	–	–	–	–	–
*mārfē ‘sausage’	-hv-	–	-f-	–	-f-	-f-	-f-	-f-	–	–
*svālfō ‘swallow (bird)’	–	-hv-		-f-	-f-	-f-	-v-	-v-	–	–
*skāklē ‘gull’	–	–	–	sk-	sk-	sk-	–	–	–	–
*(s)kālčō ‘seashell’	–	sk-	sk-	–	sjk-	sk-	sk-	(s)k-	k-	–
*skāvčā ‘beard’	sk-	sk-	sk-	sk-	sk-	sk-	–	–	–	–
*skientō ‘worn-out hide’	–	–	–	–	–	sk-	–	–	–	–
*skievēs ‘jumpy, nervous’	–	–	–	–	sk-	sk-	–	–	–	–
*skovē ‘shape, image’	sk-	–	sk-	–	sk-	sk-	–	–	–	–
*(s)lājvē ‘weak’	l-	l-	sl-	kl-	sl-	l-	l-	l-	l-	–
*(s)lāvčā ‘botfly’	–	–	–	–	sjl-	l-	–	–	–	–
*(s)likt— ‘smooth and flat’	sl-	–	sl-	–	–	l-	–	–	–	–
*snāvēs ‘short-haired’	–	–	–	–	sn-	–	–	–	–	–
*stāńčō ‘crucible’	–	st-	st-	–	st-	st-	–	–	–	–
*svālfō ‘swallow (bird)’	–	sv-		sv-	f-	sp-	sp-	sp-	–	–
*krāššē/ō ‘bog-bean’	kr-	–	gr-	–	–	–	–	–	–	–
*(k)rāvccë ‘porridge’	kr-	kr-	gr-	kr-	r-	r-	r-	–	–	–
*krāvēs ‘grey’	kr-	kr-	gr-	kr-	r-	–	–	–	–	–
*krievvē ‘reindeer herd’	kr-	kr-	gr-	–	–	–	–	–	–	–
*(p)lāk(k)ō ‘flat area?’	pl-	pl-	pl-	–	l-	l-	–	–	–	–
*(p)lāssā ‘skerry’	pl-	–	pl-	–	l-	l-	l-	l-	–	–
*plievvēs ‘shy’	pl-	–	bl-	–	–	–	–	–	–	–
*pruosē ‘severe cold’	–	–	pr-	–	–	–	–	–	–	–
*(p)ruvdës ‘bride’	pr-	pr-	br-	–	r-	–	–	–	–	–
*(t)rāstēs ‘thrush’	tr-	tr-	–	r-	r-	r-	r-	r-	r-	r-

Table 3. Initial consonant clusters and the phoneme /f/ in Proto-Scandinavian loans in Saami.

these are found in the South Saami area. The clearest examples are South Saami *Måefie* (Mo i Rana) and *Mueffie* (Mo i Vefsn), which due to their consonant /f/ must have been borrowed from Proto-Scandinavian *mōh^{w}az (> ON *mór* ‘heath’). Another interesting example is *Laakese*, the older South Saami name for the Namsen river which is now commonly called *Nååmesje*. This seems to reflect Proto-Scandinavian *laguz (> ON *lǫgr* ‘sea, lake, water’, Norwegian *-lågen* in river names); the loan must have been adopted before the Scandinavian sound change *z > *r. These as well as several other plausible candidates for Proto-Scandinavian loan names have been discussed by Bergsland (1996). Similar cases are found in the North Saami area as well. The best-known one is the name of the island *Máhkarávju* (Magerøy) in the extreme north of Norway;

-*ávju* can only reflect a Proto-Scandinavian form *aujō and certainly not its later Old Norse development *ey* ‘island’. An apparently previously unnoticed case is the fjord name *Vávžavuotna* (Veggefjord) on the island Ringvassøy north of Tromsø. Here *Vávža-* (< PSaa *vāvčë-) seems to reflect PScand *wagja- (> ON *veggr* ‘wedge’). The treatment of the consonant cluster is the same as in well-known borrowings such as SaaN *ávža* ‘bird-cherry’ < PScand *hagja- (> ON *heggr* ‘bird-cherry’).

Hence, it can be concluded that Proto-Saami had dialectally diversified before the end of the Proto-Scandinavian phase ca. 500–700 AD, and that in Scandinavia its dialects were already spread over roughly the same area where Saami languages have been spoken in historical times. Proto-Scandinavian loans thus yield a *terminus ante quem* for the presence of Saami languages in their current areas in Scandinavia. On the basis of the dating of individual sound changes such, such as *z > *r, Heikkilä (2011: 68–69) concludes that borrowed place-names demonstrate the presence of Saami languages in Scandinavia by 500 AD at the latest; the same conclusion was presented by Bergsland (1996) already.

Proto-Scandinavian loanwords also provide ample material for the reconstruction of the social setting of these contacts. This aspect has not gained very much attention in newer studies on the topic, and a thorough analysis of the material from a semantic and cultural perspective would be highly desirable. However, already a cursory application of the classical ‘Wörter und Sachen’ approach reveals notable patterns. The following six cultural domains are especially interesting (the cited forms are North Saami unless otherwise indicated):

sea and seafaring	*áhpi* ‘open sea’, *bárru* ‘wave’, *fiervá* ‘beach revealed by low tide’, *ákŋu* ‘thole’, *dilljá* ‘rowing seat’, *gielas* ‘keel’, *rággu* ‘boat rib’, *gáidnu* ‘rope for pulling a boat or a net with’, *láddet* ‘land a boat’, *sáidi* ‘saithe’, *sildi* ‘herring’, *fális* ‘whale’, *fihčču* ‘seal’s flipper’, *skálžu* ‘seashell’, *skávhli* ‘gull’, *gáiru* ‘great black-backed gull’
domestic animals	*gussa* ‘cow’, *gálbi* ‘calf (of a cow)’, *sávza* ‘sheep’, *láppis* ‘lamb’, *gáica* ‘goat’, *vierca* ‘ram’, L *hábres* ‘ram’, *mielki* ‘milk’, *lákca* ‘cream’, *ullu* ‘wool’, *ávju* ‘meadow hay’, *gáldet* ‘castrate’
agricultural products	*rákca* ‘gruel’, *láibi* ‘bread’, *gáhkku* ‘flatbread’, *gordni* ‘grain’
iron	*ákšu* ‘axe’, *niibi* ‘knife’, *ávju* ‘edge of a blade’, *dávžat* ‘whet’,[9] *stážžu* ‘crucible’, *áššu* ‘glowing coals’ (< *‘hearth (in a smithy)’), I *ävli* ‘chain’
fur trade	*skieddu* ‘old and worn hide’, *ráhččat* ‘spread a skin to dry’,[10] L *skidde* ‘skin (as merchandise)’, L *árre* ‘hair side of a hide’, L *hálldat* ~ *álldat* ‘scrape a hide clean’, S *maarhte* ‘marten’
marriage and family	*dievdu* ‘adult man, married man’, *gállis* ‘husband, old man’, *máhka* ‘a man’s brother-in-law’, S *provrese* ‘bride’, S *daktere* ‘married daughter’, *árbi* ‘inheritance’

The material clearly shows that seafaring, domestic animals and agricultural products were introduced to the Saami via Proto-Scandinavian speakers. It is interesting that words for the most common domestic animals and basic agricultural products were borrowed from Proto-Scandinavian, as there is little evidence of these animals actually having been kept by the Saami so early, let alone that the Saami would have had fields for growing grains. This suggests the existence of a trade network, in which the Saami acquired animal and agricultural products as well as iron implements from Proto-Scandinavian speakers.

This means that the Saami must have possessed means to purchase these products. Interestingly, there are also a few borrowings which seem to be connected with animal furs and hides. As it is known that Scandinavia provided furs for Ancient Rome already in the 1st century AD (Jones 1968: 23), it is not a great logical leap to connect the Saami in Scandinavia as a producer node in this trade network. This has already been proposed on the basis of archaeological evidence, and it is in any case known from the historical record that the Saami later played a key role in the Scandinavian fur trade (Zachrisson & al. 1997: 228–234). In this regard, it is significant that also words related to marriage and in-laws have been borrowed from Proto-Scandinavian. This suggests the occurrence of mixed marriages, and one can speculate that marriages between Scandinavian men and Saami women could have served as a way of securing trade relations, as has been suggested by Storli (1991). A similar institution, in fact, developed in the North American fur trade run by the English and the French, giving rise to the Métis ethnic group of mixed European and Native American ancestry (van Kirk 1980).

5. The Palaeo-Laplandic substrate in Saami

Proto-Scandinavian loans demonstrate the existence of a Saami-Scandinavian contact network in Lapland already in 500 AD, but they do not reveal how far earlier we can trace the history of Saami languages in the region. Many scholars have tended to see the Saami roots of Lapland as much older, going back to the Early Bronze Age (e.g. Carpelan & Parpola 2001) or the Stone Age (Sammallahti 2011). Some have even entertained the fantastic notion that some of the first settlers of Lapland after the last Ice Age could have been linguistic ancestors of the Saami – for example Halinen (1999), who has later (2011) changed his opinion, however.

In a methodological perspective it is interesting to note that the varying early datings are typically justified by the same type of argument: it is common to claim that the 'archaeological continuity' in a given region – i.e., the lack of evidence for some kind of cataclysmic event in the archaeological record – suggests that no language shift has taken place. This is, however, a *non sequitur* argument, because language shift is not the type of social process that needs to be accompanied by radical change in material culture (cf. Gal 1996). Häkkinen (2010a) has demonstrated the weakness of arguments based on archaeological continuity, and emphasized that linguistic datings must be established via linguistic and not archaeological methods. Hence, the right question to ask is whether there are any actual linguistic data that could establish a *terminus post quem* for the presence of Saami languages in Lapland.

According to an old theory formulated by Wiklund (1896: 7–14), the Saami had earlier spoken a non-Uralic language he called 'Protolappisch', which they supposedly had then switched to a Uralic one adopted from ancestors of the Finns. While the idea was initially popular, it later fell into disfavor among linguists, not least because Wiklund was never able to produce any convincing evidence of the former existence of his hypothesized 'Protolappisch' language. In retrospect it is also easy to see the theoretical shortcomings of the model that derive from the Zeitgeist in the turn of the 20th century: linguistic and racial origins were thoroughly confused, whereas ethnic categories were seen as everlasting and unchanging. In Wiklund's view the Saami had always been Saami regardless of whether they had spoken a Saami language or some unknown non-Uralic language.[11]

While Wiklund's theories of Saami prehistory were clearly wrong in almost all the details, his basic hypothesis of a language shift still remains completely plausible. There is a very simple reason to assume *a priori* that such a shift must at some point have occurred: while it is known that there has been continuous human inhabitation in Lapland for some 12 000 years, the Uralic proto-language itself can hardly be dated older than some 4000–6000 years BP (cf. Kallio 2006). Thus, instead of asking *whether* a language shift from unknown languages to Saami has occurred in Lapland it is more rational to try to find out *when* it did occur.

In retrospect it is not surprising than Wiklund could not present any reasonable linguistic evidence in support of his 'Protolappisch' theory. Saami historical phonology and etymology were still so poorly understood in his times that it would simply not have been possible to reliably identify traces of disappeared languages in Saami. Now the situation is very different, as Saami historical linguistics has developed into a highly advanced field of research, and also word origins have been extensively studied. This provides a much more solid foundation for searching for the elusive traces of lost languages of Lapland. To avoid the confusing ethnic implications of Wiklund's 'Protolappisch', these lost languages are best called 'Palaeo-Laplandic'; we know absolutely nothing of the ethnic identities of the people who spoke these languages, except that they certainly did not identify themselves as 'Saami'.

Before proceeding to examine concrete linguistic evidence, however, it is worth the while to ponder how a language shift actually happens. On the level of a local community the process of language shift is typically both rapid and irreversible. The shift of the language of daily communication usually occurs over the course of no more than a few generations. As the speech community adopts a new language, bilingualism first develops, and only rarely this will remain a steady state. More probably the process proceeds to a stage where nearly all young adults start speaking the target language to children, and at this point it is highly unlikely that the completion of the shift could be avoided any longer. The relatively few cases where language shifts have been succesfully reversed after this stage seem to result from carefully planned and coordinated revitalization attempts which are unlikely to have occurred in premodern times.

The basic path of language shift is neatly captured in Haugen's (1953) classical five-step scheme of the development of the speakers' competence in the outgoing language (A) and the target language (B):

A > Ab > AB > aB > B

The intermediate stage in a language shift is a bilingual speech community with skewed patterns of crossgenerational language use: the outgoing language becomes confined to communication among and with older generations, whereas the target language is increasingly spoken to peers and members of younger generations. The details of the process are naturally subject to much variation. The exact social causes of language shift can be complex and heterogeneous, but usually the speakers believe they will improve either their own or their children's chances of social or economic success by switching to use the target language (Gal 1996). The obsolescence of the outgoing language is not necessarily an aim in itself, but rather an unintended consequence of the speakers' language choices.

Language shift in a wider network of communities is the cumulative effect of multiple shifts on the local level. The more complicated nature of the process on the large scale does not, however, mean that language shift could not occur relatively quickly in a widespread communication network. In fact, the reverse is often true, because the social factors causing the shift normally affect many local communities at the same time. As an example one can consider Ireland: in most parts of the country the Irish language has fallen from an overwhelmingly dominant position to the brink of extinction over the course of mere 300 years (Hindley 1990). Only in some remote rural areas Irish remains a language of everyday communication.

During shift the outgoing language typically exerts 'substrate influence' on the target language. It needs to be appreciated that 'substrate' is merely a cover term for various kinds of features that may have been introduced to the target language through very different sociolinguistic pathways during language shift. Influence for example in the fields of phonology and syntax is typically caused by 'imperfect group learning' of the target language, which results in the creation of new structural norms that were influenced by the speakers' native language (cf. Thomason & Kaufman 1988: 87–88). In contrast, loanwords and place-names enter the target language through conscious borrowing, either by members of the shifting group themselves or by native target language speakers who have become members of the shifting community.

While the concept of 'substrate influence' is an umbrella term for heterogeneous phenomena, it appears that only certain parts of these phenomena easily lend themselves to inspection via historical linguistic methods. According to

Saarikivi (2004a: 192) there is a methodological reason to focus on the lexical component of substrate – loanwords and place-names – when studying the ethnolinguistic past: while also grammatical and typological features may have substrate origins, this is often difficult to prove, whereas the origins of words or place-names can be identified by the received methods of etymological research. Therefore, the lexicon and the place-name systems of the Saami languages are the components of language in which an unknown substrate could be discerned, if anywhere.

The challenge in studying the influence of unknown languages is that normal methods of loanword research are useless when there are no data on the putative source languages. This creates the risk that borrowing from an unknown substrate becomes an all too easy "explanation" for the origin of any word that proves tough to etymologize. Methods to overcome this problem have been developed in the field of Indo-European studies, however (e.g., Salmons 1992), and adapted to the study of Saami in Aikio (2004). Following the criteria I have earlier applied for the verification of unknown substrate, the following test can be postulated:

- *The quantitative criterion*: is there a large number of lexical items that lack an etymology?
- *The structural criterion*: do potential substrate words show non-native phonological or morphological structures, which are indicative of loan origin?
- *The criterion of irregular correspondence*: do potential substrate words show irregular sound correspondences between dialects or languages, thus indicating parallel borrowing from an outside source?
- *The semantic criterion*: do words of unknown origin cluster in semantic fields typical of substrate vocabulary (e.g., the natural environment and culture-specific concepts)?
- *The onomastic criterion*: is assumed substrate vocabulary paralleled by a corpus of place-names of unknown origin which exhibit the same kinds of non-native structures?

If the answer to each of these research questions is 'yes', the presence of an unknown substrate in the lexicon is virtually certain. A negative answer to all questions, on the other hand, implies zero evidence for unknown substrate. Naturally, the result of the test could also remain in the broad gray area between these two extremes, in which case substrate influence can merely be considered a more or less likely hypothesis.

In the case of Saami, however, it is demonstrated in Aikio (2004) that the answer to each question in the test is unambiguously positive. As regards the quantitative criterion, 550 Proto-Saami word-roots are of unknown etymology (Sammallahti 1998: 125), which amounts to more than one third of the entire reconstructed lexicon (Lehtiranta 1989). As there are also many more words with a narrower distribution in Saami languages that likewise lack any explanation of origin, the number of potential substrate words certainly exceeds one thousand.

As noted above, the Great Saami Vowel Shift provides a very useful criterion for establishing the maximum age of many Saami word-roots. The completion of this chain shift gave rise to a number of new combinations of first and second syllable vowels which never occur in word-roots with a Pre-Proto-Saami etymology. Some of these vowel combinations are frequent in vocabulary of unknown origin, suggesting that extensive borrowing from unknown languages has taken place after the completion of the Great Saami Vowel Shift. As an example, we can consider North Saami nouns of unclear etymology that point to the new Proto-Saami vowel combinations *ie–ē, *ie–ō, *ā–ë, and *ā–ō:

*ie–ē: *bielbi* ‘arrow’, *čielkkis* ‘black guillemot’, *čier’ri* ‘gravelly ground, moraine’, *dierpmis* ‘thunder god’, *fierbmi* ‘fishing net’, *fieski* ‘winter grazing ground (of a reindeer herd)’, *giegir* ‘windpipe’, *giehppi* ‘hollow under a reindeer’s lower jaw’, *giezzi* ‘short river between two lakes’, *jiegis* ‘bearded seal’, *miessi* ‘reindeer or moose calf’, *riehppi* ‘valley up in the mountains which is difficult to access’, *siekkis* ‘dewclaw (on a dog’s foot)’, *skier’ri* ‘dwarf-birch’, *vieksi* ‘young common seal’, *vielmmis* ‘deep place in a small river’, *vielti* ‘hillside, mountain side’

*ie–ō: *biedju* ‘den, lair’, *dieigu* ‘radius (bone)’, *dielku* ‘spot’, *jiellu* ‘cracked interior of a tree-trunk’, *liehkku* ‘upright board on the back of a toboggan’, *liessu* ‘den of a fox’, *liehmu* ~ *lievhnu* ‘mild weather’

*ā–ë: *áđga* ‘grassy terrain along a river’, *állat* ‘snow bunting’, *bákša* ‘castor sack of a beaver’, *dábba* ‘uppermost marrow-bone in the foreleg’, *gálva* ‘dead birch’, *hávda* ‘eider’, *njálla* ‘arctic fox’, *njárga* ‘cape, land point, peninsula’, *ráš’ša* ‘high and barren mountain’, *sáibma* ‘net for small fish’, *sálga* ‘piece of meat or fish (in soup)’, *sássa* ‘future bride, bridegroom or in-law’, *sátnja* ‘worn-out fishing net’, *šákša* ‘capelin’

*ā–ō: *ákču* ‘common seal’, *dápmot* ‘brown trout’, *fápmu* ‘strength’, *gákšu* ‘wolf bitch’, *jáldu* ‘cool weather in summer’, *láhppu* ‘thick sinew-thread’, *lávvu* ‘tent’, *njáhcu* ‘thaw (in winter)’, *ráktu* ‘flat stone, stone slab’, *rášša* ‘cold and heavy rain’, *sátku* ‘landing place (for boats)’, *skávdu* ‘two-year old harbor seal’, *spáhčču* ‘bunch of sinew-thread’

In addition to vowel combinations, features of consonantism may also suggest foreign origin. An obvious sign is the initial consonant cluster found in a few potential substrate words (cf. *skier’ri*, *spáhčču*, and *skávdu* above). Occasionally, also Saami languages further west have an initial cluster in cognates of North Saami words that lack one: e.g., N *láhppu* ‘thick sinew-thread’ ~ L *sláhppo*, S *slaahpoe* ‘reindeer sinew (for making sinew-thread)’, N *liehkku* ~ L *sliehkko* ‘upright board on the back of a toboggan’, N *liessu* ‘lair of a fox’ ~ S *pleasoe* ‘den, lair’. Notably, Qvigstad (1945: 211) already observed that South Saami has many etymologically obscure words with initial consonant clusters, and suspected that these words could be borrowings from the unknown ‘Protolappisch’ substrate language envisioned by Wiklund.

It is also remarkable that many of the words of unknown origin show irregular sound correspondences between Saami languages. About two dozen examples are given in Aikio (2004: 24–26), and many more could be cited. It is interesting that sometimes these irregular sound correspondences appear to show a certain degree of systematicity. For example, there are five likely substrate words displaying the irregular correspondence between West Saami *s and East Saami *š:

- SaaS *saahpesh*, SaaN *sáhppasat* (< *sāppës-ëk) ~ SaaK *šāχ̄p.rəs* ‘small intenstine’ (< *šāppërës)
- SaaS *saasne* ‘half-dry, rotten tree’ (< *sāsnë) ~ SaaN *suostu* ‘rotten tree’ (< *suosnō) ~ SaaSk *šošnn* ‘dead and dry pine-tree’ (< *šošnë)
- SaaS *satnje* ‘fishing net’ (< *sëńńë) ~ SaaN *sátnja* ‘worn-out fishing net’ (< *sāńë) ~ SaaSk *šaannj* ‘rag’ (< *šāńë)
- SaaN *siekkis* (< *sieŋkēs) ~ SaaK *šiŋ̄ke* ‘dewclaw (on a dog’s foot)’ (< *šiŋkējē)
- SaaN *suonjar* ‘beam, ray (of light)’ (< *suońër) ~ SaaK *šūń.seδ* ‘shine through the clouds (of the sun)’ (< *šuońëstē-)

Notably, all these words display also other irregularities in sound correspondence. One can postulate the hypothesis that they were separately borrowed from distinct but related source languages, which had a regular correspondence between an *s*-type sibilant in the West Saami area and an *š*-type sibilant in the East Saami area. This hypothesis appears to receive some support from the fact that there are relatively few North Saami words with initial *š*- that are of unknown origin, but quite many such words in Skolt and Kola Saami (cf. T. I. Itkonen 1958: 541–565).

As the semantics of words of unknown origin are examined, it is immediately clear that a large majority of them belongs to semantic fields in which substrate influence is typical. There are literally hundreds of words of obscure origin which in one way or the other pertain to the natural environment; these include names of birds, fish, and marine mammals; words for topographic features; and words pertaining to snow, ice, and weather conditions (Aikio 2004: 12–14). It is particularly telling that many words refer to features that are typical of the natural environment of Lapland, but rare or nonexistent in more southern Finland and Karelia. Consider the following selected examples:

bird names	*állat* ‘snow bunting’, *biehkan* ‘rough-legged buzzard’, *bovttáš* ‘puffin’, *bupmálas* ‘northern fulmar’, *giron* ‘rock ptarmigan’, *guovssat* ‘Siberian jay’
marine animals	*šuorja* ‘shark’, *morša* ‘walrus’, *buovjja* ‘beluga’
plants	*skier’ri* ‘dwarf-birch’, *lageš* ‘stunted mountain birch’
topography	*balsa* ‘palsa (frost peat mound)’, *ráš’ša* ‘high and barren mountain (with no vegetation on top)’, *ráktu* ‘flat stone, stone slab’, *riehppi* ‘valley up in the mountains which is difficult to access’
climate	*cuokca* ‘naturally formed bridge of ice and snow’, *jassa* ‘patch of perpetual snow in the mountains in summer’

Words related to reindeer form a particularly interesting semantic field which contains many roots of obscure origin. These include words for describing reindeer according to their age, sex, and appearance; words pertaining to the behaviour of reindeer; and a highly elaborate lexicon for describing reindeer anatomy:

- *luohpet* ‘one-year old reindeer cow which has had a calf’, *čoavččis* ‘reindeer cow which has lost its calf’, *vuobirs* ‘three-year old reindeer bull’, *goasohas* ‘five-year old reindeer bull’, *nulpu* ‘reindeer bull which has shed its antlers’, *gabba* ‘completely white reindeer’, *miessi* ‘reindeer calf’, *čearpmat* ‘one-year old reindeer’
- *bálgat* ‘move restlessly about (of reindeer during the insect plague)’, *livvut* ‘lie down (of reindeer)’, *njolgi* ‘trot (of reindeer)’, *čora* ‘small reindeer herd’, *čiegar* ‘winter pasture (where the snow has been trampled and dug up by reindeer)’, *suovdnji* ‘hole dug by reindeer in snow (when looking for lichen)’, *fieski* ‘winter pasture (where reindeer have recently dug up the snow)’
- *čuossi* ‘skin on the forehead’, *ginal* ‘chin-piece (on a reindeer hide)’, *feavli* ‘leg hole on a hide (when the leg skins have been cut off)’, *njávvi* ‘long hair on the neck’, *seahkku* ‘long hair on the hoofs’, *námmi* ‘skin on the antlers’, *dábba* ‘upper marrowbone on the foreleg’, *cabbi* ‘lower marrow-bone on the foreleg’, *njiehcahas* ‘lower marrow-bone in the hind leg’, *noras* ‘upper marrow-bone in the foreleg’, *alesgahcin* ‘a small backward branching part in an antler’, *čeaksa* ‘omasum’, *doggi* ‘abomasum’, *njárčá* ‘wall of the abdomen and the diaphragm’, *vuossa* ‘womb’, *giehppi* ‘hollow under the lower jaw’, *čagar* ‘gristle; penis’, *guoccat* ‘penis’, *čoamoahas* ‘shoulder (as a meat cut)’, *fáhkká* ‘calf of the leg (as a meat cut)’, *muošmi* ‘meat between the thigh and ribs’, *urkádeahkki* ‘biceps’, *válká* ‘fat on the neck’, *gieldagas* ‘achilles tendon (of a reindeer)’, *morči* ‘large vein’, *beađbi* ‘shoulder-blade’, *gátnis* ‘sacrum’

Notably, none of the likely substrate words connected with reindeer contain anything that would seem to testify of reindeer herding. This is quite logical, as in a hunting society only small numbers of tame reindeer would have been used as decoys and for transport. The shift to large-scale reindeer herding occurred among the Scandinavian Saami in the Middle Ages, and during the transition also the terminology of wild reindeer hunting became adapted to the new form of livelihood (Sommerseth 2011). The fact that this terminology has also preserved large numbers of substrate words suggests that Palaeo-Laplandic groups had a profound impact on the practices and culture of wild reindeer hunting among the prehistoric Saami.

The final criterion for verifying the existence of an unknown substrate involves place-names. As shown in Aikio (2004: 17–20), there are extremely many Saami place-names that are of obscure origin. For the most part these place-names belong to major topographic formations, such as rivers, lakes, fjords, and mountains, which suggests they are old. Many such names include phonological features that reveal their foreign origin, such as secondary vowel combinations and initial consonant clusters. This indicates that the place-names have their origin in the same substrate languages that have also extensively contributed to the lexicon of Saami.

Interestingly, one also finds some recurring elements in substrate place-names which seem to be connected with particular topographic features. The most evident case are North Saami mountain names which combine an etymologically obscure initial element with an ending *-ir* (< *-ērē): e.g., *Čuosmmir*, *Gealbir*, *Hoalgir*, *Jeahkir*, *Nuhppir*, *Nussir*, *Ruohtir*, *Šuošmir*, *Váhčir*. It seems highly likely that the element *-ērē reflects a substrate language lexeme meaning 'mountain'. There are also a few other recurrent name components which probably have a substrate origin, at least *skiečč- 'watershed', *čār- 'uppermost lake', *jeak(k)- 'isolated mountain' (cf. *Jeahkir* above), *nus- 'mountain top on the edge of a mountain area' (cf. *Nussir* above), *sāl- 'large island in the sea', *čiest- 'seashore cliff', and *inč- 'outermost island'. (Aikio 2004: 21–25.)

The Palaeo-Laplandic substrate in the Saami lexicon and place-names also provides us with a straightforward method of dating the language shift. The fact that unetymological vowel combinations are found in numerous substrate words shows that they have been adopted after the Great Saami Vowel Shift. Even more importantly, substrate words also include initial consonant clusters in the West Saami area, quite like Proto-Scandinavian loans. Occasionally, one also finds the phoneme /f/ in likely substrate items (e.g. North Saami *uffir* 'rocky seashore', *láfol* 'Eurasian Dotterel', *skuolfi* 'owl'). This shows that the adoption of substrate vocabulary must still have continued after the break-up of Proto-Saami and at the time of the emergence of Northwest and Southwest Saami proto-dialects in Scandinavia. The same is, of course, implied by substrate place-names as well as by the fact that numerous substrate words show very restricted distributions in the Saami languages, and cannot thus be reconstructed to Proto-Saami.

Thus, we arrive at the surprising conclusion that substrate influence of Palaeo-Laplandic languages was *contemporaneous* with the adoption of Proto-Scandinavian loanwords. As the Proto-Scandinavian contacts in Scandinavia must be equated with the Early Runic era ca. 200–700 AD, we thus have an absolute dating also for the spread of Saami languages to Lapland and for the disappearance of the unknown Palaeo-Laplandic languages. All evidence indicates that it has taken place only after the beginning of our era, likely about 1500 years ago.

We still need to deal with one argument that is at odds with the interpretation suggested above. Sammallahti (2001; 2011) has also presented linguistic evidence in support of his view that Pre-Proto-Saami was spoken in Lapland in the Late Stone Age more than 5000 years ago. This evidence involves the Northwest Indo-European loans present in Saami languages (cf. section 3 above). Sammallahti's argument is based on a statistical comparison of the distributions that Proto-Uralic words and loans of varying age show within Saami languages. His method is to examine how widely each word in a given lexical stratum is attested in Saami, and then calculate a 'distributional index' for each stratum, which indicates the average spread of words from a particular source.

His figures indicate that the very old Northwest Indo-European loans confined to Saami have a clearly lower distributional index (4,7) than either Proto-Uralic words or loans from Indo-European sources that are shared with other Uralic languages (which have distributional indexes between 7 and 8,8). As an explanation he suggests that the Northwest Indo-European loans were acquired after the Saami languages spread to their present areas in the North (Sammallahti 2001; 2011: 212).

Difficulties in this interpretation have, however, been identified by Häkkinen (2010a: 29). The problem is that we are dealing with a statistical argument based on a very small set of data (19 loan etymologies), and as such it is highly sensitive to minor errors and random variation in the data. Now it appears that two etymologies in the data must be abandoned altogether, whereas in six other cases the distribution turns out to be wider than reported by Sammallahti.[12] Once these corrections to the data are made, a recalculation changes the average distributional index of independent old Indo-European loans from 4,7 to 6,3, and the difference of this figure to the slightly higher distributional indexes of other strata is not statistically significant. Moreover, even if some of these lexical isoglosses could be shown to be very ancient, this would not yet prove that they were formed in their present locations instead of having been relocated there through linguistic expansion. For example, archaic western-eastern lexical isoglosses in North Finnic (e.g., *ovi* vs. *uksi* ‘door’, *vihta* vs. *vasta* ‘bath whisk’, *nisu* vs. *vehnä* ‘wheat’, *viruttaa* vs. *huuhtoa* ‘rinse’) now materialize in northern dialects of Finnish and Karelian where they were carried along with the North Finnic expansion. Therefore, Northwest Indo-European loans seem to provide evidence neither for nor against the early presence of Pre-Proto-Saami in the North, and they do not oppose the dating of the language shift from Palaeo-European to Saami in Lapland proposed here.

6. The Saami substrate in North Finnic

As the chronology of the Saami languages in Lapland is now established, we can turn our attention to the more southerly areas where the origins of the Saami language branch must be sought. It is well-known that still in the Middle Ages vast parts of the Lakeland of inland Finland and Karelia were not yet settled by North Finnic tribes, and that Saami people known as ‘Lapps’ in historical sources inhabited these lands. The former wide spread of Saami habitation in Finland was already recognized in the earliest studies on the history of the Saami. Schefferus (1673) argued that the Saami had earlier lived in southern Finland but they had been driven out of these territories by the Finns before the introduction of Christianity. His evidence mainly involved fragments of Finnish and Saami oral tradition. Later historical research also revealed ample documentation of ‘Lapps’ living in the South of Finland (T. I. Itkonen 1948 I: 92–97).

It must be said that even though the Saami past of Finland was already recognized by early scholars such as Schefferus, the treatment of the topic by later research has often been haphazard and biassed. Three kinds of problematic approaches to the treatment of the historical 'Lapps' have been characteristic of historiography of Finland: 1) ignoring 'Lapps' by leaving them unmentioned; 2) denying that the 'Lapps' were Saami; and 3) denying that the 'Lapps' had historical significance. Such problems of research history have been recently examined by Lehtola (2008).

It is, of course, no coincidence that these perspectives originally developed in the context of 19th century Finnish nationalism which created a need to legitimize the claim to territories that had been colonized by the Finns. Nevertheless, it is strange that the view never really became subject to thorough critical reevaluation but instead slowly evolved into a form of pathological denial in the mainstream of historiography of Finland. While it is beyond the scope of this essay to examine why this has happened, it must be emphasized that the history of what is now Finland is in large part the history of the Saami, and that the general disregard of this fact is not based on rational arguments but on an ideological perception of the Saami as 'people without history' (cf. Wolf 1982). While probably no modern historian would consciously subscribe to such a way of thinking on the theoretical level, its legacy is still very much visible on the practical level of historiography.

There is, of course, reason to ask to what extent modern ethnic labels such as 'Saami' can be used in reference to historical and prehistoric populations. Huurre (1979: 151–154) has criticized the view according to which the historical 'Lapps' of the Finnish Lakeland really were an ethnic group or had any connection with the Saami of Lapland. While these questions are in themselves legitimate, the discussion surrounding them has been confusing, as both Huurre and his followers on this issue have generally tended to ignore all linguistic evidence regarding the language of the 'Lapps' (see Lehtola 2008). It ought to be clear, however, that the question of the ethnicity of the historical 'Lapps' cannot be reasonably approached without taking into account what languages they spoke.

Scholars such as Wiklund (1911–1912) and T. I. Itkonen (1948 I: 99–107) have demonstrated through onomastic studies that in large parts of southern Finland substrate place-names deriving from extinct Saami languages are found. Modern research based on more critical methods and more comprehensive materials has both verified this conclusion and established many new etymologies (Saarikivi 2004b; Aikio 2007c). More recently also many examples of loanwords deriving from these lost Saami languges have been identified in Finnish and Karelian dialects (e.g. O. Korhonen 1979; Koponen 1996; Aikio 2009). Thus, the southern 'Lapps' mentioned in historical sources have undoubtedly been Saami at least in the sense that they have spoken Saami languages. To have a convenient term, these extinct and unknown languages can be called Lakeland Saami, in contrast to the surviving Lapland Saami languages.

While the existence of place-names of Saami origin in southern Finland has been known for more than a century, there exists no modern comprehensive analysis of the Saami elements in the Finnish nomenclature. The earlier studies by Wiklund and T. I. Itkonen are seriously outdated, and while methodological questions and the distribution of some widespread loan name types have been recently studied (Saarikivi 2004b; Aikio 2007c), the potential of this line of study has been scarcely realized so far. This is evident from the fact that even names of Finnish cities such as *Tampere* (Rahkonen 2011b; Heikkilä 2012) and *Ilomantsi* (Aikio 2003) have recently turned out to have straightforward Saami etymologies.

In the absence of a comprehesive study on the topic we may still estimate the spread of Lakeland Saami languages in Finland by examining the distribution of certain widespread substrate place-name types. The most plausible etymologies involve cases where a borrowed place-name component refers to some easily verifiable quality of the designated geographic object. Some Saami words of this type are quite widely attested in the place-names of central and southern Finland, such as PSaa *jeaŋkē ‘bog’, *vuoččō ‘wet bog’, *vuonë ‘long and narrow bay’, *kukkē(-s) ‘long’, and *ëlē- ‘upper’. An examination of the distribution of such names reveals how Lakeland Saami must have been spoken throughout southern Finland with the possible exception of some coastal areas (Saarikivi 2004b; Aikio 2007b). Naturally, also dozens of other Saami substrate elements can be identified in the place-names of the area.

Loanwords and place-names are our only source of information on Lakeland Saami. As such they reveal very little of the concrete features of these languages. We will never even known how many distinct Lakeland Saami languages there were, even though due to the size of the area there must have been several. However, we can still verify that Lakeland Saami had completed the same important Proto-Saami linguistic innovations as Lapland Saami further north. The forms of borrowed place-names testify of the effects of the Great Saami Vowel Shift. For example, the vowel development *a > *ō > *uo can be seen in the lake names *Lumperoinen* and *Lummene* which derive from Proto-Saami *luompël ‘lake along a river’ (T. Itkonen 1993); the word goes back Pre-Proto-Saami *lampil and is cognate with Finnish *lampi* ‘pond, small lake’. This is corroborated by Saami loanwords in southern Finnish dialects that show the same development, such as *julku* ‘long pole, rod’ (< Proto-Saami *čuolkōj < Proto-Uralic *śalkaw), *nuoska* ‘thaw’ (< Proto-Saami *ńuockë ‘wet’ < Proto-Uralic *ńački), and *puoto* ‘dam’ (< Proto-Saami *puodō ‘dam’ < Proto-Uralic *pado) (Aikio 2009).

Also morphological idiosyncracies of Saami languages can be to some extent traced in the material. Lake names of the type *Kukasjärvi*, *Kukkasjärvi*, and *Kuukasjärvi* (< Proto-Saami *kukkē-s ‘long’) show that also Lakeland Saami had attribute adjectives with the suffix *-s. Separate attribute forms of adjectives are a typological rarity, and the origin of the Saami attribute form suffix *-s is unclear. Also, Saami superlative suffixes can be indentified in place-names: the lake names *Elimysjärvi* (< Proto-Saami *ëlē-mus ‘uppermost’) and *Ilomantsinjärvi* (< Proto-Saami *ëlē-māńčë ‘uppermost’) reflect two different Saami superlative formations of the spatial noun root *ëlē- ‘up, high’ (Aikio 2003).

Thus, phonological and morphological criteria verify that the Lakeland Saami languages spoken by historical ‘Lapps’ were truly Saami, in the sense that they go back to the same Proto-Saami language as the Saami languages in Lapland. M. Korhonen (1979) has proposed that Lakeland Saami languages derived from a distinct ‘Southern Proto-Saami’ language which had already earlier differentiated from ‘Northern Proto-Saami’, the ancestor of Lapland Saami languages. However, this conclusion is based on scarce evidence and speculative arguments which have been refuted by Sammallahti (1984: 147–148).

An interesting feature of the substrate place-names deriving from Lakeland Saami is that they attest many distinctively Saami words that are of unknown origin. The following place-name elements serve as examples (most of these etymologies are discussed in Aikio 2007c):

Jokuu-	< PSaa *čuokōs ‘track, way’ (SaaSk *čuâggas*)
Juolu-	< PSaa *čuolō ‘fence’ (SaaSk *čuâll*)
Kaavi-	< PSaa *kāvë ‘bend; small bay’ (SaaN *gávva*)
Kiesimä-, *Kiesimen-*	< PSaa *keasē-mē ‘pulling, dragging’ (SaaN *geassin*)
Kinis-, *Kenes-*	< PSaa *këniš ‘gnome’ (SaaN *ganeš*)
Kotko-, *Kotkuu-*	< PSaa *kuotkōj ‘narrow cape, isthmus’ (SaaN *guotkku*)
Kälkä-, *Kelk-*	< PSaa *keadkē ‘stone, rock’ (SaaN *geađgi*)
Köngän-	< PSaa *keavŋēs ‘big rapids’ (SaaN *geavŋŋis*)
Lieksa	< PSaa *leakšā ‘boggy area’ (SaaN *leakšá*)
Liva-, *Livo-*, *Livu-*	< PSaa *livë ‘rest (of reindeer)’ (SaaN *livva-*)
Läänä	< PSaa *lāńā ‘young birch; thicket’ (SaaN *látnjá*)
Moit-, *Moitan-*, *Moijan-*	< PSaa *muojdē ‘hunt of wild reindeer in the winter’ (SaaI *myejđi*)
Naakkima-	< PSaa *ńākë-mē ‘sneaking, stalking’ (SaaN *njáhkan*)
Paahta-, *Pahdinki*, *Päht-*	< PSaa *pāktē ‘cliff, rock’ (SaaN *bákti*)
Pouni-	< PSaa *povnë ‘tussock’ (SaaN *bovdna*)
Rappaat-	< PSaa *rāppēs ‘rough, rocky terrain’ (SaaN *ráhpes-*)
Sapsa-, *Sapso-*	< PSaa *šāpšë ‘whitefish’ (SaaI *šapšâ*)
Siita-, *Siitin-*	< PSaa *sijtë ‘winter village’ (SaaN *siida*)
Suono-, *Suoni-*, *Suonen-*	< PSaa *suońō ‘wet bog’ (SaaN *suotnju*)
Tolva-	< PSaa *toalvē ‘trot (of reindeer)’ (SaaN *doalvi*)
Vermas-, *Vermi-*, *Virma-*	< PSaa *viermē ‘fishing net’ (SaaN *fierbmi*)
Visu-	< PSaa *vëšō ‘thicket’ (SaaSk *vââšš*)
Vuonamo-, *Vuonos-*, *Vuonis-*	< PSaa *vuonë ‘long and narrow bay; fjord’ (SaaN *vuotna*)
Vuonteen-	< PSaa *vuontës ‘sand’ (SaaI *vuodâs*)

Also several of the Saami loanwords in the Finnish dialects were adopted from Saami words of unknown origin, such as the following (a detailed discussion of these etymologies is presented in Aikio 2009):

aaje ‘spring; boghole’	< PSaa *ājëk ‘spring’ (SaaN *ája*)
junta ‘row of fishing nets’	< PSaa *jontējō id. (SaaN *joddu*)
kieppi ‘snow hole; snow drift’	< PSaa *čieppë ‘snow hole’ (SaaN *čiehppa*)
kontio ‘bear’	< PSaa *kuomčë ‘bear’ (SaaN *guovža*)
kuusanka ‘Siberian jay’	< PSaa *kuoksëŋkë id. (SaaN *guovssat*)
luppo ‘lichen on trees’	< PSaa *lëppō id. (SaaN *lahppu*)
nuotio ‘campfire’	< PSaa *ńuodšō id. (SaaN *njuoršu*)
purnu ‘cache for foodstuffs’	< PSaa *puornë id. (SaaI *puornâ*)
päläs ‘place for foot on a ski’	< PSaa *peadŋēs id. (SaaN *beađŋŋis*)
sivakka ‘ski’	< PSaa *sëpēkkē id. (SaaN *sabet*)
suokko ‘downy birch’	< PSaa *soakē ‘birch’ (SaaN *soahki*)
viti ‘new snow’	< PSaa *vëcë id. (SaaN *vahca*)

The Saami substrate in the Finnish dialects thus reveals that also Lakeland Saami languages had a large number of vocabulary items of obscure origin. Most likely many of these words were substrate in Lakeland Saami, too, and ultimately derive from languages spoken in the region before Saami. In some cases the loan origin of these words is obvious due to their secondary Proto-Saami vowel combinations such as *ā–ë in *kāvë ‘bend; small bay’ and *šāpšë ‘whitefish’. This substrate can be called ‘Palaeo-Lakelandic’, in contrast to the ‘Palaeo-Laplandic’ substrate that is prominent in the lexicon of Lapland Saami. As the Lakeland Saami languages became extinct and only fragments of their lexicon can be reconstructed via elements preserved in Finnish place-names and dialectal vocabulary, we are not in a position to actually study the features of this Palaeo-Lakelandic substrate. Its existence, however, appears evident from the material above.

While the former distribution of Lakeland Saami in Finland seems rather clear, it is much more difficult to determine its eastern boundaries. It appears, however, that Saami substrate place-names are attested throughout White Karelia (Kuzmin 2010) and also in the Veps territory in the Svir River basin (Mullonen 2002). Certainly they also occur in Olonets Karelia, which is left between these two areas, even though the issue has not been studied in much detail. It is particularly interesting that the Northeast Finnic name of Lake Onega (Olonetsian *Iänizjärvi*, Veps *Änine*) seems to be reflect Proto-Saami *eanē- ‘big’, which would appear to imply that the lake was outside the area the speakers of Proto-Finnic were originally acquainted with. Whether Saami languages had spread even east of Lake Onega remains less clear. Matveev (2001) has claimed that Saami substrate place-names are found in a very wide area in northern Russia, but the weak methodology he applies for distinguishing Saami from other Finno-Ugric place-names leaves serious doubts about the validity of his conclusions (Saarikivi 2002). Still, there are some possibly Saami place-name elements that are attested in several names in the Arkhangelsk region and in the area surrounding Lake Beloe, for example *Šid-* ~ *Šit-* (? < PSaa *sijtë ‘winter village’), *Šub-* (? < PSaa *supē ‘aspen’) and *Njuhč-* (? < PSaa *ńukčë ‘swan’). On the whole, however, this material seems to be scarce and open to alternative interpretations (Saarikivi 2004b).

Whatever the exact prehistoric eastern boundary of Saami languages may be, it is still clear that in the early Middle Ages prior to the northward expansion of North Finnic tribes these languages were spread over a region covering nearly all of Finland, Karelia, and Lapland. This is an enormous territory with an area close to one million square kilometers. Nevertheless, the degree of linguistic divergence within this area was not very deep. As was shown in section 4 above, the first dialect boundaries within Lapland Saami seem to have emerged during the Proto-Scandinavian period 200–700 AD. While Lakeland Saami languages may have shown a somewhat deeper divergence from their sister languages in Lapland, the substrate place-names adopted from them show that they, too, had participated in major Proto-Saami innovations such as the Great Saami Vowel Shift.

All this suggests that the Medieval Saami territory was a result of a large-scale linguistic expansion from a geographically limited core area somewhere in southern Finland or Karelia. The more exact location of this core area remains unclear. Häkkinen (2010b) argues that it would have been located even further from Lapland – south of Lakes Ladoga and Onega, between the Karelian Isthmus in the west and Lake Beloe in the east. His arguments on this point are, however, rather impressionistic and the idea is only partly congruent with onomastic evidence. While there are Saami substrate place-names in the Svir River basin and possibly even in the Lake Beloe region, no reliable examples are known south of Lake Ladoga or even the Karelian Isthmus. They do, however, occur immediately north of the isthmus. In the archipelago of northwestern Ladoga, for example, there is a large island of oblong shape with the name *Kuhkaa*, which certainly reflects PSaa *kukkē-s ‘long’. Incidentally, this name also shows that the Lakeland Saami language in the region had developed preaspiration of geminate stops (*kk > *hk) like most Lapland Saami languages, too.

The exact dating of the expansion of Proto-Saami is likewise difficult, but some definite temporal limits can be established. As argued by Bergsland (1996) and Heikkilä (2011), the *terminus ante quem* for the spread of Saami to central Scandinavia is 500–600 AD. On the other hand, the Great Saami Vowel Shift seems to have occurred sometime in the Early Iron Age, to judge from the fact that the word *ruovdi* ‘iron’ has participated in it. This word goes back to Pre-Proto-Saami *ravta (cf. Fi *rauta* ‘iron’) and was adopted from Proto-Germanic *raudan (> ON *rauði* ‘bog iron ore’). On the basis of detailed analysis of loanword evidence, Heikkilä (2011: 74) has dated the Pre-Proto-Saami change *a > *ō (> *uo) to the last centuries BC. If this is correct, we have a time frame of roughly 800 years during which the expansion and consequent dialectal disintegration of Proto-Saami must have taken place.

Not all will probably accept this reasoning. Many scholars of Uralic prehistory have maintained that proto-languages could have been spoken over vast areas for centuries or even millennia before their disintegration, and I have also myself initially subscribed to this view (Aikio 2000). Such an idea defies common sense, however. Proto-languages have also been natural languages spoken in natural speech communities, and we obviously need no particular proof for the claim that a network of Iron Age hunter-gatherers spread over an area of one million square kilometers could not have formed a single speech community. The idea that a single language could have been spoken from southern Finland to the Arctic Coast of Norway and from central Scandinavia to Lake Onega is simply not realistic. At the largest, the geographic extent of hunter-gatherer languages has been about a third of this, as in the case of the Chipewyan who inhabited an area roughly the size of Finland in the Canadian Arctic. It is worth bearing in mind, however, that the traditional territories occupied by most North American native groups were considerably smaller. Moreover, the historical Saami territory is for the most part not arctic but subarctic boreal forest fragmented by innumerable lakes, rivers, and marshlands; in such areas speech communities tend to be more densely spread. Hence, the diversification of Proto-Saami to a large number of local Saami languages must be interpreted as a consequence of a linguistic expansion, which spread the language to this huge region over which a coherent communication network could no longer be maintained.

The historical Saami area was probably more diverse in terms of culture and livelihoods than in terms of language. Finnish oral tradition gathered mainly in the 19th century provides a rich source of information for the reconstruction of Lakeland Saami culture. The Lakeland Saami can mostly be characterized as hunter-gatherers whose primary means of subsistence were fishing and hunting, especially of wild reindeer; thus, they seem to have resembled the recently vanished Forest Saami cultures in the woodlands of Lapland (cf. Tegengren 1952). Interestingly, however, in parts of southern Finland, such as in Tavastia, there is also evidence of slash-and-burn agriculture as a subsidiary livelihood of the Saami (Salo 2000); as the Lapland Saami have not practiced agriculture, such historical data have usually not attracted the attention they deserve. Yet different types of subsistence patterns have probably occurred among the Saami on the coasts of the Gulf of Bothnia, where archaeological material reveals the major significance of sealing (Broadbent 2010). It is worth noting that the northern half of the Gulf of Bothnia seems to have been a Saami sea before the expansion of the Finns and to a lesser extent the Scandinavians along the Bothnian coasts in the Viking Age.

This brings us to questions of prehistoric ethnicity. As there appear to have been major differences in subsistence patterns and culture between the various historical Saami groups, we can hardly assume these groups to have shared a common ethnic identity either. It seems unlikely, for example, that Early Medieval hunters and fur traders of the Scandinavian Mountains would have felt they had very much in common with slash-and-burn farmers in the woods of Tavastia, even if they spoke closely related languages. Even during recent history the North Saami and the Skolt Saami, for example, do not seem to have considered themselves members of the same ethnic group; the emergence of a common ‘pan-Saami’ identity is, of course, a rather new development connected with the emancipation of indigenous peoples. Hence, in the Iron Age and the Middle Ages the ‘Saami’, as a linguistic group, have formed a heterogeneous network of communities that greatly differed from each other in terms of subsistence strategy, culture, and likely also ethnic identification. Interestingly, though, these groups shared the same endonym that was inherited from Proto-Saami *sāmē 'Saami'; this is remarkable in itself, as ethnonyms tend to be historically unstable and only very rarely can be reconstructed to proto-languages of any time depth. Nevertheless, it does not imply that all groups calling themselves *sāmē would have had a common ethnic identity.

Considering this, it actually makes some sense that Huurre (1979: 151–154) has questioned whether the historical 'Lapps' in the Finnish Lakeland can be connected with Lapland Saami. If we approach the question from the perspective of culture and ethnic identity this is indeed far from clear. What is clear, however, is that the 'Lapps' were not ethnic Finns who had chosen a hunter-gatherer subsistence pattern, even though this possibility is raised by Huurre. One simply cannot ignore the pervasive expression of otherness that surrounds the 'Lapps' in Finnish oral tradition: the Lapps are consistently described as a strange group with a different way of life, and they are also mentioned to speak a distinct 'Lapp' language. Also the folk-etymological interpretation that opaque place-names are remnants of this language is commonly attested. Occasionally 'Lapps' are even portrayed as dangerous, especially due to their alleged powers in magic.

It is also problematic that neither Huurre nor others who have cast doubt on the 'Saaminess' of historical Lapps have defined what exactly they mean by 'Saami' in a historical context. While we can speculate on the ethnicity of past populations, it is still clear that these historical Saami societies formed a single linguistic network which was clearly delimited to societies belonging to other, linguistically radically different networks – the Scandinavians and the North Finnic tribes. As scholars we need a label for the societies belonging to this network, and it is difficult to see what else this label could be than 'Saami'.

However heterogeneous the network of early Saami societies may have been, its fate was to shrink dramatically due to the expansion of North Finnic tribes to what is now Finland and Karelia. The penetration of Finns into Saami territory seems to have begun already in the Roman Iron Age. Salo (2000) has thoroughly analyzed the settlement history of southwestern Finland on the basis of evidence from archaeology, history, oral tradition, and onomastics, and has come to the conclusion that an early Finnic-speaking settlement on the coast of Finland Proper and Satakunta started to expand inland along the Kokemäenjoki River in 300–600 AD. In its early stages, however, this expansion only came to cover the core areas of Tavastia, thus forming the prerequisite for the later deep dialectal divergence between Southwestern and Tavastian dialects of Finnish. The southwestern coast and prehistoric Tavastia were separated by a stretch of wooded hinterland that remained sparsely populated for centuries. Against this context we can also understand why *Häme*, the Finnish name of Tavastia, and the corresponding tribal name *hämäläinen* are etymologically identical with the Saami endonym *sāmē. Salo presents the plausible hypothesis that also the Finnish names originally referred to the Saami, but their denotation was transfered to the Finnish Tavastians during the Finnicization of the area.

Here we can make a brief transgression to the prehistory of the Finns. Unlike Tavastia, the Finnic settlement on the southwestern coast is considered age-old by Salo (2000), going back to the Stone Age. Numerous other scholars have also advocated a Finnic linguistic continuity in southwestern Finland since the Bronze Age or the Stone Age, and this view is the cornerstone of the so-called ‘continuity theory’ of Finnish origins that was especially popular in the 1980s and 1990s (see Aikio & Aikio 2001 for discussion). The idea is, however, puzzling because it appears quite clear that Finnic languages were widely spread south of the Gulf of Finland in the Middle Iron Age when the Finnic-speaking area in southwestern Finland was still a small and isolated outlier bordered by the Baltic Sea on one side and the Lakeland inhabited by Saami speakers on the other. To overcome this problem it has been repeatedly suggested that the sea ‘connected’ or ‘united’ southwestern Finland with the Finnic core area further south (e.g., Sammallahti 1984: 142; Carpelan & Parpola 2001: 91–92; Häkkinen 2011b: 58). It is, however, difficult to understand how the Gulf of Finland could have served as a linguistically unifying factor in prehistoric times as it has been the opposite in historical times, despite the constant progress in seafaring technology. In general, it ought to be self-evident that major geographic obstacles such as gulfs promote linguistic divergence and not convergence. Notably, this conclusion is now also endorsed by Parpola (this volume).

On the other hand, Kallio (2006: 18–19) suggests that the Proto-Finnic speaking area could have surrounded the entire Gulf of Finland, which would eliminate the geographic discontinuity. Here he, like also Carpelan and Parpola (2001: 91–92), makes reference to T. Itkonen’s (1984) model of Proto-Finnic dialects around the Gulf. However, this theory is difficult to combine with the relatively recent origin of the Finnish settlement in the Nyland region. This is evident in the region’s dialectology, which features a combination of Southwestern and Tavastian strata and in the eastern part also Karelian influence (T. Itkonen 1992). There is some historical evidence of earlier Saami inhabitants of Nyland (Voionmaa 1943), and on the borders of western Nyland and Finland Proper, clear cases of Saami substrate place-names also are found. Examples include the hill *Elimäki* in Vihti (< PSaa *ëlë ‘high’),[13] the lake *Elimoträsket* in Pohja (< PSaa *ëlēmus ‘uppermost’), the hill *Siitoinmäki* in Nummi and the rock *Siitinvaha* in Kisko (< PSaa *siejtē ‘rock idol’), and the river *Moitanoja* in Kuusjoki (< PSaa *muojdē ‘hunt of wild reindeer in winter’) (Aikio 2007c: 191). Probably in Nyland there was Saami settlement on the coast of the Gulf of Finland, which was only later displaced by Finns expanding from Tavastia and Finland Proper, and also Swedes settling along the coast.

Despite the early expansion of the Finns into Tavastia, it was not until the Early Middle Ages that the expanding Finnish and Karelian settlement started to exert wide pressure on the Lakeland Saami habitation throughout southern Finland. In Finnish historiography it is common in this connection to speak of ‘the formation of settlement’ (Finn. “asutuksen synty”), which entails the misleading connotation that Finland was *terra nullius* before the arrival of the Finns. While there seems to have been a remarkable reluctance among scholars to admit that the Saami had already settled the area and did not just wander around aimlessly, the reality is of course that these lands were appropriated from the Lakeland Saami. The primarily hunter-gatherer Saami were outnumbered, and their fate was to become assimilated to the expanding Finno-Karelian population (cf. Julku 1992), although in some places they likely were driven out of their former lands or even perished in violent conflicts. In parts of Savo, Kainuu, and Ostrobothnia, the Finno-Karelian expansion continued until the Early Modern Age, and in Lapland to the present day.

As a result, Lakeland Saami languages became extinct and only traces of them can be detected in place-names and loanwords in their former speaking areas. What was preserved of the once very wide Saami territory was its northwestern periphery, where Saami languages survived – although barely – in their strongly transformed Laplandic form. The history of Saami languages is not unlike that of the Celtic languages, which initially expanded to a very wide area in continental Europe, but survived until modern times only in the peripheries – in Brittany and on the British Isles. As the eventual fall of Lakeland Saami and the marginalization of Lapland Saami are largely known history, we need not go into further details of this story here.

7. On the correlation of linguistic and archaeological findings

The prehistoric linguistic processes examined above raise the question whether some of the reconstructed sociolinguistic events could be correlated with the archaeological record. Of course, the pursuit of such a synthesis of Saami ethnolinguistic prehistory is a much more hypothetical undertaking than the linguistic analyses presented in the previous sections, as there is little agreement on methodological questions and theoretical foundations of linguistic-archaeological correlations. Thus, it is necessary to leave the specific details of Saami prehistory aside for a moment and to briefly examine some general questions regarding the possibilities and limits of such an approach.

During recent decades the possibilities of making linguistic and ethnic interpretations of archaeological results has received much attention in studies on Uralic prehistory. Even though there is a large body of publications on these topics, it must be said that the theoretical apparatus on which much of this research is based involves some notable problems. A thorough discussion on the methodological difficulties in the field is provided by Saarikivi and Lavento (2012), who conclude that the traditional approaches to the correlation of archaeological and linguistic results are based on many ambiguous assumptions. Indeed, it is possible to discern several erroneous theoretical premises that seem to be prevalent in Uralic ethnohistorical research. The reason why the fallacy of these premises has often remained unidentified is that the premises themselves are rarely even explicitly stated, let alone critically discussed. One can draw attention to four types of dubious assumptions, which often seem to lie behind theories of Saami ethnic history.

1) *The nonuniformitarian fallacy*: prehistoric conditions are postulated, which seem to differ in some principal way from those attested in historical times.
2) *The anachronistic fallacy*: evidence deriving from a particular prehistoric period is used for drawing conclusions regarding another period.
3) *The category mistake fallacy*: incompatible concepts deriving from different disciplines are compared against each other.
4) *The ad ignorantiam fallacy*: the fragmentary nature of the evidence of prehistory is not properly taken into account.

Each of these fallacies in the theoretical apparatus can be illustrated with some examples. Regarding the nonuniformitarian fallacy, by far the most widespread argument of this type is the frequent postulation of very large "homelands" or speaking-areas of proto-languages, which was already touched upon in the previous section. One example is the popular idea that Proto-Uralic would have been spoken throughout the vast area defined by the spread of Comb Ware in Northeastern Europe since 4200 BC (e.g., Carpelan & Parpola 2001: 82; note that Parpola (this volume) has changed his view on the issue). The problem is that there is nothing in the historical or ethnographic record that would serve as a parallel to the existence of prehistoric hunter-gatherer speech communities of such size. Instead, cultural areas with a low degree of social organization are typically characterized by great linguistic diversity, and hence one can assume that a large number of distinct languages have been spoken in Northeastern Europe at any given time in prehistory.

Apparently, hypotheses of vast "homelands" are in part motivated by the second type of fallacious argument, namely anachronistic correlations between archaeological and linguistic results. The historical record shows that language spread and language divergence are either simultaneous phenomena or, in the case of a rapid geographical relocation or spread of a speech community, the latter at least very quickly follows the former. As an example of rapid relocation, the Comanche emerged as a distinct group when they broke off from Shoshoni tribes in present-day Wyoming and moved south, acquiring horses and adopting a Plains type of culture in the late 17th century (Hämäläinen 2008). Today Shoshoni and Comanche are distinct languages (Charney 1993: 2), even though still partially mutually intelligible (McLaughlin 2000). A rapid spread occurred in the case of the Cree languages, which are now spoken in Canada along a dialect continuum over 4000 kilometres wide. This wide territory arose as a result of an expansion since the 18th century, which was triggered by the Cree becoming incorporated into the fur trade institution and thus acquiring firearms and advanced trapping technology from Europeans (Ray 1996: 278–280). As a result, Cree has developed into a diverse dialect continuum with considerable (but not full) mutual intelligibility between its varieties (Wolfart 1997: 390).

Thus, if archaeological and linguistic results are to be meaningfully combined, reconstructed periods of linguistic divergence ought to be paired with archaeological phenomena that either were simultaneous with or immediately preceded the divergence. It is meaningless, however, to compare archaeological waves of influence with patterns of language divergence that must have taken place thousands of years later. For essentially this reason, the association between Comb Ware and Proto-Uralic has been recently rejected by Kallio (2006). As another example of such anachronistic comparisons one can mention how the various ancestral forms of Saami are linked to different archaeological horizons by Carpelan (2003; 2006). In his view, the differentiation of the Finnic and Saami language branches began by the introduction of the Battle Axe culture to southwestern Finland in 3200 BC, as the emerging Saami community was left outside its sphere of influence. The later spread of Lovozero Ware in Lapland in the beginning of the Bronze Age (1900– BC), then, would indicate that small communities speaking ‘an early Proto-Saami language’ moved to Lapland, mixing with the original population, and ‘a fully Proto-Saami cultural expression’ would eventually have been created by the emergence of Kjelmøy Ware in the archaeological record in the beginning of the Iron Age (700– BC) (Carpelan 2006: 87). While the connection of Kjelmøy Ware to Saami might just be within the limits of possibility, the dating of the differentiation of Finnic and Saami to the Stone Age and postulation of Saami-speaking groups in the Early Bronze Age completely contradicts the linguistic chronology of Saami established by comparative linguistic methods. We shall return to the question of Kjelmøy Ware below.

There is, however, yet a deeper problem involved in most of the linguistic-archaeological comparisons made in the field of Uralic prehistory. It is rather obvious that ideas of vast prehistoric speech communities have also been inspired by the premise that there is some sort of direct correlation between archaeological horizons, cultures, languages, and ethnic groups. As archaeologically definable ceramic types are often distributed over wide areas, this has given an impetus to see these ceramic types as ethnic emblems of some widely spread language community. This hypothesis is heavily criticized by Saarikivi and Lavento (2012), and it is indeed easy to see the category mistake involved. As an archaeologically defined area (i.e. an ‘archaeological culture’), a culture, a language, and an ethnic group are simply not the same kind of entity, there is no reason to assume that they should correspond to each other in some simple manner. However, as this idea has nevertheless been so prevalent in the field of Uralic prehistory, it is necessary to scrutinize it in more detail.

First, it must be noted that this premise has usually been merely implicit in studies on Uralic ethnic history: while it is assumed that archaeological, linguistic, and ethnic boundaries match, rarely if ever this theoretical assumption is explicitly mentioned. This is evident, for instance, in Carpelan (2006) where the concepts of archaeological, linguistic, and ethnic boundaries are used almost interchangeably. In another paper, Carpelan justifies this kind of approach as follows:

> "It has been a matter of dispute whether a human group represented by an archaeological culture has spoken a single language. One easily asks why should an archaeological entirety defined by a typology of artefacts represent linguistic unity. However, it would be more consistent to ask why people carrying a culture defined by the same factor of identity, who have lived in constant contact with each other, would *not* have spoken the same language? While one can take as a starting point a situation in which the carriers of the same archaeological culture have a common form of speech, it is possible that within the boundaries of an archaeological culture also bilingualism has existed, at least temporarily. Especially a population movement may have had the effect that a local community or a part of it would have acquired an archaeological cultural image represented by the immigrated population. One also has to take into account the possibility that the speakers of one language had differentiated to become carriers of separate archaeological cultures." (Carpelan 2008: 316; translated from Finnish.)

It is noteworthy that while Carpelan considers bilingualism within one archaeological culture a valid possibility, this is still viewed as an exceptional circumstance, and normally a group of people sharing some important features of material culture should share one language. The validity of this assertion can easily be tested by examining whether historically known multilingual areas also show corresponding cultural diversity.

To cite a simple example involving just two languages, one can consider the case of Takia and Waskia spoken on Karkar Island off the northeastern coast of Papua. These languages are not genetically related: Takia is Austronesian and Waskia belongs to the Papuan Madang family. Even so, Takia and Waskia cultures have been described as practically identical; according to McSwain (1977: 3), the Takia and the Waskia "represent a single fairly homogeneous socio-cultural system." Notably, though, there has been structural convergence of the languages to the extent that the originally Austronesian grammar of Takia has become radically remodeled on the basis of Waskia (Ross 2001).

There are numerous similar examples from all over the world of a highly similar culture being shared by speakers of distinct and even unrelated languages. For instance, among the Puebloan Indian peoples of the American Southwest, in an area a few hundred kilometers across, languages belonging to four different families are spoken: Hopi (Uto-Aztecan); Tewa, Tiwa, and Towa (Kiowa-Tanoan); Eastern and Western Keres dialects (an isolate dialect continuum); and Zuni (a language isolate). All these groups share the fairly homogeneous Puebloan cultural complex. While there naturally also are notable cultural differences between various Puebloan groups, these do not correspond to language family boundaries in a simple manner (Kirchhoff 1954), and the connection of the various languages with prehistoric Publeoan cultural subgroups is in many cases unclear (Hale & Harris 1979).

As yet another case one can consider California, which is known for its very high diversity of native American languages. An illuminating example of how this linguistic diversity is not matched with corresponding cultural heterogeneity is provided by three neighboring tribes in Northern California: Hupa, Yurok, and Karuk culture has been described in all respects as essentially identical (Sapir 1921: 214; Kroeber 1925: 5; Gifford & Block 1930: 16; Bright & Bright 1965: 249; Drucker 1965: 176). Nevertheless, the languages spoken by these peoples are not even genetically related: Hupa is Athabaskan, Yurok is Algic, and Karuk is an isolate, although sometimes assigned to the speculative Hokan family.

It is thus evident that cultural and linguistic boundaries often do not match. As this is so, one certainly cannot expect the boundaries of prehistoric 'archaeological cultures' to show simple matches with linguistic boundaries either. This has often been noted by comparative linguists working on the prehistory of language families other than Uralic: e.g., Peiros (1997: 88) notes in his discussion of Australian linguistic prehistory that "there are many examples where several communities have very similar or even identical [cultural] complexes." However, during recent decades many scholars working on Uralic prehistory have engaged in futile debates over which archaeological cultures should be matched with which reconstructed languages. The debated hypotheses are based on a premise that is, in light of historical and ethnographic records, completely erroneous. While some of the purported linguistic-archaeological correlations may of course be valid, in most cases we simply have no method of determining whether this really is so.[14]

There is yet a fourth method of reasoning that contributes to questionable associations between 'archaeological cultures' and linguistic or ethnic groups. It is evident that the proto-languages reconstructed by linguists represent only a fraction of the languages that actually existed in the past. As glottogenesis is a result of linguistic differentiation, the further back in time we proceed with our reconstructions the less languages we end up reconstructing; but it is surely not the case that the number of languages in the world has dramatically increased during the last couple of millennia. The inescapable conclusion is that an overwhelming majority of languages that were spoken in the world a few thousand years ago have gone extinct. Despite this, the possibility of unknown languages is often ignored when ethnic interpretations of archaeological material are suggested. Among other things, this leads to false dilemmas, as in the disagreement between Baudou (2004) and Zachrisson (2004) on whether the Iron Age cultures in inland central Scandinavia were 'Scandinavian' or 'Saami'. In a more objective approach to the question one would also need to seriously consider the possibility that they were neither.

What consequences, then, does all this have to the interpretation of Saami ethnic history? An important implication is that we should stop asking questions such as whether this or that type of ceramics was "Saami" or not. Many theories of Uralic and Saami ethnic history have been based on the association of a particular ceramics type with a reconstructed proto-language, such as Comb Ware with Proto-Uralic. From such a starting hypothesis, then, the historically known distributions of languages are derived via a complex chain of subsequent correlations between languages and archaeological areas (e.g., Carpelan & Parpola 2001). Such an approach involves two serious problems. First, it does not appear to be possible to reverse the chain of reasoning and derive the chosen starting hypothesis from known historical, archaeological, and linguistic facts. Second, there is no evidence for the view that prehistoric language borders even correspond to boundaries of archaeological areas in the first place. Thus, it is necessary to reject all theories of Saami prehistory and ethnogenesis based on this type of argumentation.

When the incompatibility of archaeological and linguistic areas is correctly admitted, the task of reconstructing past ethnic developments reveals itself as extraordinarily difficult. For each linguistic and archaeological result one must then ask whether it is even possible to correlate it with anything established within the other discipline. There is essentially no direct link between the research objects of historical linguistics and archaeology (e.g., between proto-languages and ceramics). While the same prehistoric people have certainly used both languages and ceramics, these two entities are not bound by same rules of social conduct.

In practice the situation is not hopeless, though. As proposed by Saarikivi and Lavento (2012), we can attempt a sociolinguistic reconstruction as an intermediate step, and then see whether this reconstruction could be compared to social interpretations of archaeological data. The problem is, however, that our methodological framework for conducting anything of the like in practice is still seriously underdeveloped: there is a need for a theoretical synthesis of historical linguistics and sociolinguistics, but steps towards such a synthesis have only started to be taken during recent decades. This means that we are still not in a much better position than applying rules of thumb when postulating hypotheses on prehistoric sociolinguistic processes.

8. Saami ethnolinguistic prehistory: what, where, and when?

We can now return to the findings of comparative linguistics about the history of Saami languages. The topics we have addressed above include the nature of the linguistic relationship between Saami and Finnic; the contacts of Pre-Proto-Saami with Pre-Proto-Finnic, Germanic, and Baltic languages; the contacts between Proto-Saami and Proto-Scandinavian; the substrate influence of extinct and unknown languages on Saami; and the substrate influence of Saami on North Finnic languages. The interpretation of the results allows us to distinguish between five major phases in the evolution of the Saami languages:

1. *The emergent phase* during which Pre-Proto-Saami emerged as a distinct language from the Finno-Saamic dialect continuum.
2. *The transformative phase* during which major linguistic innovations transformed the language into Proto-Saami.

3. *The dispersal phase* during which the Proto-Saami language broke up and early forms of Saami spread over a vast area comprising the Finnish and Karelian Lakeland as well as Lapland.
4. *The diversification phase* during which the Saami dialect continuum diverged into many local Saami languages spoken in Lapland and the Lakeland.
5. *The marginalization phase* in medieval and early modern times, during which Lakeland Saami languages became extinct due to the spread of Finnish and Karelian.

The very different linguistic processes that have taken place during these phases imply that the underlying social reality also must have radically changed from one period to the other. The major challenge of Saami ethnolinguistic prehistory is to reconstruct the sequence of social processes that account for this linguistic chronology, and to place these prehistoric developments in space and time.

It goes without saying that our knowledge of the extralinguistic reality of the early phases in the development of Saami is extremely limited. We know that as Pre-Proto-Saami emerged as a distinct dialect or language spoken in its own speech community, its speakers were in direct contact with Pre-Proto-Finnic and Germanic-speaking groups, as well as in sporadic or indirect contact with Baltic speakers. An exact geographic interpretation of these findings is difficult, however.

The most probable option would seem to be to assume that Pre-Proto-Saami was spoken somewhere in the Lakeland of southern Finland and Karelia, as this would allow us to explain the adoption of Germanic loanwords (Aikio 2006: 42; Kallio 2009: 38). It has been often suggested that there is a connection between the adoption of Proto-Germanic loanwords to Finnic and Saami and the influence of the Nordic Bronze Age culture on coastal Finland and Estonia in 1700–500 BC (see, e.g., Carpelan & Parpola 2001: 91–92); there appears to be no other plausible archaeological correlate for this phenomenon. Saarikivi (2004b) and Häkkinen (2010b) argue for a more eastern origin in the direction of Lake Onega and Lake Beloe, but it is not clear how the Germanic loanword strata should be accounted for in such a scenario. As Saami languages, in any case, spread via a large-scale linguistic expansion, we cannot *a priori* disregard the possibility that they spread not only from south to north but also from west to east. In any case, we can hardly assume that the speaking area of Pre-Proto-Saami covered the entire Lakeland from Tavastia to Lake Onega, as such a territory is too wide to remain linguistically uniform; such a spread would probably have prevented the uniform completion of the transformative phase which resulted in the birth of the Proto-Saami language (contrary to what is maintained by Kallio 2009: 38). Moreover, such a hypothesis would make it difficult to explain the later adoption of a Palaeo-Lakelandic subtrate in Proto-Saami (see section 6).

These are all educated guesses, and more research is needed before definite answers can be given to where the emergent phase and the transformative phase of Saami language history took place. Moreover, it should be admitted that we have no knowledge at all about the beginning of the emergent phase – the questions where and why the Pre-Proto-Saami and Pre-Proto-Finnic languages first diverged from each other cannot be answered in light of present research. Despite this, there is no shortage of theories in this regard. To mention a particularly widespread view, it has often been thought that a Finno-Saamic proto-language was spoken in the Comb Ware archaeological culture in southern Finland, and that the Finnic and Saami language branches became separated due to the spread of the Northwest Indo-European-speaking Corded Ware (Battle Axe) culture to the southwestern part of the area in about 3200 BC (see, e.g., Carpelan & Parpola 2001: 83–84; but Parpola (this volume) no longer supports the theory).

It must be said that this popular scenario, while superficially appealing, belongs more to the realm of speculation than to solidly argued theory. On the basis of the discussion above, one can point out that there is no clear evidence for views such as 1) that there ever was a distinct Finno-Saamic proto-language; 2) that the differentiation of Pre-Proto-Finnic and Pre-Proto-Saami could have taken place as early as 5000 years ago; 3) that the Comb Ware culture in Finland was Uralic-speaking; 4) that widespread archaeological horizons such as Comb Ware 'culture' and the Corded Ware 'culture' even correspond to language families; and 5) that Finnic was spoken in Finland before the Iron Age. Moreover, it can be asked whether the reconstruction of Stone Age ethnolinguistic processes in Northern Europe is a realistic endeavor in the present state of research, as our knowledge of such processes even in the Iron Age is still very limited. The problem in Stone Age ethnolinguistics is that there is a lot of blank canvas to paint on and only very little evidence to restrict our imagination. Those with a critical mind-set, however, must ponder whether we can at present establish anything regarding ethnicity at such time depths.

It makes sense to turn the attention to questions of more recent prehistoric ethnolinguistic processes, as they, too, pose many unsolved problems. When searching for an archaeological correlate for the disintegration and spread of Proto-Saami, we are on a much more solid foundation, as there is precise temporal and geographic information on the outcome of this process: the Saami linguistic expansion must have reached the South Saami territory in central Scandinavia by 500 AD, and according to Heikkilä's (2011) datings of Proto-Saami sound changes, the expansion cannot have started before the last centuries BC. Therefore, we have a definite timeframe of about 800 years in which we can seek archaeological correlates for the process.

It has been independently noted by Heikkilä (2011: 75–76) and Häkkinen (2010b: 61) that there is, indeed, a surprising correlate to the expansion of Saami in the archaeological record of Lapland. The period between 250–800 AD in Lapland is characterized by 'archaeological invisibility': the production of iron and ceramics ceased, and finds from this period are scarce and scattered. Metal objects associated with this period are imported. In Carpelan's words, "no recognizable type of archaeological relic seems to be characteristic for the Middle Iron Age of the northern and eastern cultural sphere. No distinctive feature is known that would reveal how the people lived and behaved after the end of Early Metal Age." (Carpelan 2003: 60–61; translated from Finnish).

On the basis of the linguistic chronology we know that this is precisely the period when Saami languages spread to Lapland and pushed the Palaeo-Laplandic languages to extinction. At the same time, the emerging Saami societies in Scandinavia became – it seems – suppliers and purveyors in a fur trade network operated by speakers of Proto-Scandinavian. It might seem paradoxical that such a dramatic change in the social, economic, and ethnic structure of society is not expressed in the archaeological record by an influx of new types of finds. Nevertheless, it is expressed as a radical *change*, even if the result of this change is the lack of archaeological evidence. Carpelan has pointed out that the cause and meaning of this change is not well understood (2003: 87); but as noted by Häkkinen (2010b: 61), his own cautiously articulated assumptions regarding the nature of the period would seem to fit very well to the scenario outlined above:

> "[After the beginning of the Common Era] begins the utilization of wilderness areas that originated in the peasant cultural context of Finland, Sweden, and Norway; the inhabitants of the wilderness, the Proto-Saami, who belonged to the eastern hunter-gatherer cultural sphere, begin to be used as purveyors and later also as taxpayers. (...) Soon after the beginning of this wave of influence the production of iron and ceramics ceases in the eastern cultural sphere. I assume that Saami culture then began to transform into some kind of purveyor culture of wilderness products and, at the same time, gave up certain activities which had been characteristic of it when it still had led a self-sufficient life without a notable need for surplus production." (Carpelan 1984: 105; translated from Finnish.)

The current linguistic findings clearly point to the conclusion that this is the crucial turning point when Saami ethnicities have formed in Lapland. Viable alternatives seem to be difficult to find. I have cautiously suggested the spread of Kjelmøy Ware in Lapland since the 7th century BC as a potential correlate of the expansion of Saami (Aikio 2004: 30), but its dating appears to be too early to combine with the linguistic chronology. Moreover, this proposal suffers from the general implausibility of associating spreads of ceramics types with the speaking areas of languages. Thus, it appears reasonably clear that the ethnogenesis of the Saami in Lapland is instead connected with the archaeologically 'silent' period in the Middle Iron Age.

This finding raises many new questions. We can envision language shifts and trade networks, but it still remains entirely unclear what the actual causes and social mechanisms of the expansion of Saami languages were. Such questions have been scarcely touched upon in research so far. It has occasionally been suggested that the northward spread of Saami resulted from the push effect of the North Finnic expansion (Janhunen 2005: 85–86), but this idea must be rejected as chronologically impossible; the spread of North Finnic to the Lakeland is simply too late to account for the spread of Saami to Lapland. More plausibly one can hypothesize that the rise of the fur trade would have served as a push factor; this would imply that the original speaking area of Proto-Saami was located in some kind of key position in relation to emerging Germanic trade networks. Such a hypothesis is attractive, as it entails a causal link between the presence of extensive Germanic loanword strata in Proto-Saami and the later expansion of the language itself. Other possibilities, however, can certainly also be found. What happened in Lapland in the Middle Iron Age is an enigma of Saami prehistory, and no coherent theory of Saami ethnogenesis can be put forth before we gain an understanding of the nature of this period. Collaborative research on the topic by linguists and archaeologists is now needed.

As the development of the Saami languages after their disintegration approaches the border of history, we need not go to the details of that process here. In the Late Iron Age from 800 AD onwards so-called rectangular stone settings emerge in the archaeological record of Lapland. According to several archaeologists (e.g., Carpelan 2003; Halinen 2011), these are the earliest finds that can with complete certainty be associated with the Saami. This appears obvious from a linguistic perspective as well, as Palaeo-Laplandic substrate languages can hardly be assumed to have survived to this period, and the divergence of the Saami languages must already have been well on its way. From rectangular stone settings the continuity to more recent historical periods is evident (see, e.g., Carpelan 2003). However, the actual linguistic divergence of the Saami languages is not reflected in the archaeological material in a straightforward way. For example, in the archaeological record of the Inari region one can observe how sites characterized by the same assemblage have given rise to Inari Saami communities on the one hand and Skolt Saami communities on the other (Saarikivi & Lavento 2012: 203–204).

Finally, it is in order to note what the present results do *not* imply. What has been presented above is a chronology of the linguistic development of Saami, and the origins of Saami cultures or the genetic origin of the Saami people are altogether different topics which could not be addressed in detail here. When speaking of ethnic history, it must be remembered that ethnogenesis is a process that involves linguistic, cultural and demographic factors. While Saami languages can be shown to have come to Lapland from the south, the Saami as ethnic groups did not “come” from anywhere – they were formed in their present territories through a complex social process that involved the adoption of a new language. The earlier speakers of ‘Palaeo-Laplandic’ languages belong to the cultural and genetic ancestors of the Saami even if they were not their linguistic ancestors. Thus, the prehistory of Lapland and the prehistory of Saami languages are two very different histories indeed.

Endnotes

* I am obliged to Laura Arola for critical discussions on the topic of this essay.

1. In the traditional Uralic reconstruction, long vowels (*ī, *ē, *ō and *ū) also have been postulated for West Uralic. It is, however, demonstrated in Aikio (2012) that these long vowels are a specifically Finnic innovation, and cannot be reconstructed for the proto-stages of other Uralic languages.
2. SaaN *bievla* ‘snowless patch’, *duollji* ‘hide’, *duovli* ‘tinder’, *faggi* ‘hook’, *giehka* ‘cuckoo’, *gahpir* ‘cap’, *giehpa* ‘soot’, *gohččut* ‘call, order’, *guoibmi* ‘companion, spouse’, *guovllas* ‘wooden collar’, *jávri* ‘lake’, *johtit* ‘move, travel, migrate’, *leaibi* ‘alder’, *loggemuorra* ‘tree that splits along its annual rings’, *luokta* ‘bay’, *luossa* ‘salmon’, *luovdi* ‘net float’, *luovvi* ‘storage platform’, *riessat* ‘fringe a scarf’, *ruoida* ‘shank’, *sarvva* ‘moose’, *sarvvis* ‘reindeer bull’, *suoidni* ‘grass, hay’, *suolu* ‘island’, *suorri* ‘fork, branch’, *vietka* ‘adze’, *vuoras* ‘old’; SaaL *miehttjen* ‘far away’, *muolos* ‘hole in the ice (near the shore in spring)’, *sassne* ‘tanned leather’; SaaI *ruodâs* ‘wrist part of a glove’, SaaS *saertie* ‘reindeer heart (as food)’. For the etymologies, see the Álgu database (http://kaino.kotus.fi/algu/).
3. SaaN *bahta* ‘ass’, *boldni* ‘mound’, *borjjas* ‘sail’, *borsi* ‘rapids in a canyon’, *boršut* ‘foam’, *buoidi* ‘fat’, *deahkki* ‘muscle’, *duoddut* ‘tolerate’, *gahččat* ‘fall’, *gavja* ‘dust’, *geahččat* ‘look, watch’, *geardni* ‘thin snow-crust’, *gierdat* ‘endure’, *guobir* ‘reindeer hoof’, *guohpa* ‘mold’, *guoldu* ‘snow storm’, *guolla* ‘testicle’, *guomu* ‘chyme’, *guos’si* ‘guest’, *guovla* ‘overhanging snowdrift’, *guovlat* ‘peek’, *lađas* ‘joint’, *lahttu* ‘limb’, *luoikat* ‘lend’, *luoska* ‘decorative trimming on the edge of a man’s coat’, *mas’sit* ‘lose’, *ravda* ‘edge’, *ruoksi* ‘udder’, *ruossat* ‘stumble’, *ruovda* ‘edge’, *ruovdi* ‘iron’, *sadji* ‘place’, *suovdi* ‘gill’, *suovri* ‘filthy person’, *viessat* ‘get tired’, *vuohččču* ‘narrow and wet bog’, *vuohppi* ‘small and narrow bay’, *vuoksa* ‘depth of a fishing net’, *vuopman* ‘hunting fence’, *vuorbi* ‘lot’, *vuordit* ‘wait’, *vuordnut* ‘swear’, *vuos’su* ‘bellows’, *vuotta* ‘shoelace’, *vuovdi* ‘forest’; SaaS *boernes* ‘embryo’, *doerpedh* ‘need’, *guejhtie* ‘strong heat’, *guelhtie* ‘cold weather in summer’, *moenedh* ‘mention’, *roevtedh* ‘get sunburnt’, *soegkes* ‘burnt’, *vuerie* ‘senses’; SaaL *buollda* ‘hillside’, *buollnat* ‘wilt’, *gahppat* ‘leap, jump’, *guobas* ‘witch’, *guorgoj* ‘rocky shore’, *luogge* ‘rectum’, *nuobrre* ‘thin inner part of birch-bark’, *vuolldo* ‘the strongest bull in the reindeer herd’; SaaP *ruos’sjie* ‘a kind of hard grass’; SaaSk *teä´mes* ‘dark, dim’. For the etymologies, see the Álgu database (http://kaino.kotus.fi/algu/).
4. I have excluded one independent Baltic loan etymology which was still supported in Aikio (2006: 40), namely that of SaaN *biebmat* ‘feed’ (< PSaa *piemmë- ? < Pre-PSaa *pämmi-); this verb is compared to Lithuanian *penimis* ‘fatling’ by Sammallahti (1998: 231). The sound substitution *-nim- > *-mm- is in itself somewhat unusual, in addition to which there appears to be no Baltic verb that could account for the Saami form; the *-m-* is only found in the derived noun *penimis*, cf. Lithuanian *penas* ‘food’, *penėti* ‘feed, nurse, fatten’.
5. In the case of SaaN *šielbmá* ‘threshold’ (cf. Lithuanian *šelmuo* ‘frame (of a window or roof); door; long beam, balk’), one is inclined to hypothesize that the Pre-Proto-Finnic source form *šelma actually survives in Finnish *helma* ‘hem’. Even though the assumed semantic shift ‘frame, etc.’ > ‘hem’ is not straightforward, the Finnish word lacks a plausible alternative etymology; the proposed comparison to Proto-Germanic *xelmaz ‘helmet’ is even more difficult to substantiate semantically.

6. Note also Erzya Mordvin *l'epe* ‘alder’, which could go back to yet a third shape *lippä; more probably, however, the word was borrowed into Mordvin from Pre-Proto-Finnic.
7. One might consider it strange to group Pite Saami together with South and Ume Saami under the southwest dialect, because synchronically Pite Saami is much closer to Lule Saami. However, from a dialectological point of view there is no actual contradiction, as the earliest dialect boundaries need not have been located where the deepest language boundaries later developed. On the other hand, the evidence regarding clusters of the stop + liquid type in Pite Saami is limited to two words in my data and there is also one counterexample (*r-* instead of *tr-* in the word for ‘thrush’), so this classification of Pite Saami remains hypothetical. However, this detail has no implication to the validity of the model in other respects.
8. It is possible that there was a further subdialect boundary within the northwest dialect. This is suggested by the fact that Lule Saami shows a cluster *sl-* or *sjl-* in loans, whereas North Saami only has *l-*, as well as by the curious detail that the predecessors of these languages seem to have independently borrowed the Proto-Scandinavian word *flauha[z] ‘flea’ in different shapes: L *láffes* (< *lāffēs) vs. N *lávkkis* (< *lāvkkēs). Due to the limited evidence, however, this question will not be pursued further here.
9. A new etymology: SaaN *dávžat* ‘whet’ < PSaa *tāmčë- < PScand *dang^{w}ja- > ON *dengja* ‘hammer; whet (e.g. a scythe)’.
10. A new etymology: Saan *ráhččat* ‘stretch a skin to dry’ < PSaa *rāččë- < PScand *braidja- > ON *breiða* ‘stretch out, spread out (e.g. for drying), unfold’.
11. Interestingly, over a hundred years later the same way of thinking lives on in Wiik's (2004) extravagant theory of the origin of Saami. Just like Wiklund, Wiik confuses racial (genetic) and linguistic concepts, and connects modern ethnic groups with remote prehistoric periods. A curious example is Wiik's (2004: 30) illustrative map of Northern Europe at the end of the last Ice Age, in which “Saami people” are portrayed wandering in a huge circle around the receding ice sheet. Although Wiklund's fantasies about Ice Age Saami differed in details, the similarities are striking.
12. The following corrections can be made to Sammallahti's material on early independent Indo-European loans in Saami:
    - SaaN *guoržžu* ‘evil spirit; person with the evil eye’ can be excluded from the list as it is most probably cognate with Fi *karsea* ‘ugly, terrible’ and *karsas* ‘squint-eyed’.
    - SaaN *deatnu* ‘major river’, which is mainly attested in the eastern inland dialects of North Saami, is probably a metaphorical appellativization of the river name *Deatnu* (Tana), the major river in the area (Paikkala 2007 s.v. *Teno*); as a parallel it can be mentioned that the Finnish word *kymi* ‘major river’, mainly attested in dialects of the Kymi basin, seems to have a similar background in a river name. As the river name *Deatnu* appears to be primary and its original appellative basis remains unknown, it cannot be etymologized as Indo-European.
    - SaaN *suopman* ‘dialect; tone of voice’ should have a distribution index of 3 and not 1, as cognates are also attested in Skolt and Ter Saami. As a side note, Sammallahti (2001: 401) derives the word from Indo-European *stomen- ‘mouth’, but it could be semantically better compared to Indo-European *sh$_2$omen- ‘song’ (> Greek *hymnos* ‘hymn’, Vedic *sā́man-* ‘song’); note especially the meanings of SaaSk *suõmm* ‘melody’ and SaaT *sī̃m* ‘quiet voice; section of an incantation chant’.

- SaaI *korttâđ* ‘bind’ (< PSaa *kërttë-) is the derivational base of the noun *korccâ* ‘leather strap’ (< *kërccë < *kërttës), cognates of which are found in all Saami languages except for Ter Saami (Lehtiranta 1989: 42–43); hence, the word should have a distributional index of 8 instead of 1.
- SaaN *čuoris* ‘brownish gray (of an animal’s hair)’ cannot be separated from its consonant-stem derivative *čuorgat* ‘gray (of hair)’, which gives it a distributional index of 8 instead of 4.
- SaaN *čearda* ‘tribe’ has a cognate in South Saami and should have a distributional index of 3.
- SaaN *burgot* ‘forbid’ has a cognate in Pite Saami and should have a distributional index of 3.
- SaaN *gatna* ‘dandruff’ also has Pite and Kildin Saami cognates and should have a distributional index of 7.
- SaaN *gárži* ‘cramped’ has a cognate in Pite Saami and should have a distributional index of 7.

13. There is also a village and parish called *Elimäki* in eastern Nyland. This name has a slightly different Saami etymology. While *-mäki* means ‘hill’, there is no actual hill with the same name in the area. The name is a folk-etymologically restructured back formation of the former name of lake *Elimäänjärvi*, which has been drained. As the lake was situated in the headwaters of River Teutjoki, the specific *Elimää-* quite obviously reflects Proto-Saami *ëlē-mus ‘uppermost’.
14. Theoretical and methodological problems similar to those in Uralic prehistoric studies have surfaced in research traditions in other areas as well. For instance, Erdosy (1995) describes a very familiar-sounding situation in attempts to combine archaeological and linguistic results on Indo-Aryan prehistory, involving, for instance, “mutual ignorance of the aims, complexity and limitations of the respective disciplines”, “a feedback cycle of misinformation [between the disciplines]”, “fatal flaws in the definition of “culture” as a recurring assemblage of artefacts”, and a “virtual absence of theoretical discussion”.

Appendix. Proto-Scandinavian loans with initial consonant clusters and the phoneme /f/ in West Saami

Loans with /f/:

SaaN *fiervá* (< *fiervā), SaaS *fïerve* (< *fiervë) ‘low tide; beach revealed by low tide’ < PScand *ferwō > ON *fjara* ‘low tide; beach revealed by low tide’. – ON *fjara* is an analogically restructured nominative form; the expected phonologically regular form would be **fjǫr*.
SaaN *fiel'lu* (< *fiellō) ‘board’ < PScand *felhō > ON *fjǫl* ‘board’
SaaN *fihčču* (< *fiččō) ‘seal’s flipper’ < PScand *fitjō > ON *fit* ‘webbed foot of waterfowl’
SaaN *fális* (< *fālēs) ‘whale’ < PScand *h^{w}alaz > ON *hvalr* ‘whale’
SaaL *láffes* (< *lāffēs) ‘flea’ < PScand *flauha[z] > ON *fló* ‘flea’
SaaN *márfi* (< *mārfē) ‘sausage’ < PScand *marh^{w}a > ON *mǫrr* ‘suet’. – Note that SaaSk *mää´rf* ‘sausage’ is evidently a rather recent loan from North Saami due to its /f/ and its irregular lack of consonant gradation.

Loans with an initial cluster of the type *sC-:

SaaN *spálfu* (< *svālfō) ‘swallow (bird)’ < PScand *swalwō (? *swalh^{w}ō) > ON *svala* ‘swallow’. – ON *svala* is an analogically restructured nominative (the expected form is **svǫl*).

SaaS (obsolete) <*slikt*> (< *sliktë) ‘smooth’, SaaN *livttis* ‘smooth and even’ (< *liktēs) < PScand *slihtaz > ON *sléttr* ‘flat, smooth, even’

SaaN *skálžu* (< *skālčō) ‘seashell’ < PScand *skaljō > ON *skel* ‘shell’

SaaN *skávžá* (< *skāvčā) ‘beard’ < PScand *skagja > ON *skegg* ‘beard’

SaaL *sjlávttjá* ‘warble fly’, SaaN *lávžá* ‘horsefly’ (< *(s)lāvčā) < PScand *klaggjan > ON *kleggi* ‘horsefly’

SaaN *stážžu* (< *stāńčō) ‘crucible’ < PScand *stainjō. – Not attested in Scandinavian, but *stainjō is the expected cognate of Old High German *steinna*, Old English *stǽna* ‘stone or earthenware pot’.

SaaL *slájvve* (< *slājvē) ‘powerless, weak, diluted’, SaaN *láivi* (< *lājvē) ‘diluted, tasteless’ < PScand *slaiwaz > ON *slær* ~ *sljór* ‘blunt, dull’

SaaN *skávhli* (< *skāklē) ‘gull’ < PScand *skagl—, cf. *skaglingaz > ON *skeglingr* ‘young gull’

SaaN *skievis* (< *skievēs) ‘jumpy, nervous’ < Pre-PScand *skewwaz > PScand *skeggwaz > Swedish and dialectal Norwegian *skygg* ‘shy, timid’.

SaaL *skovve* (< *skovē) ‘pattern, image; specter, ghost’ < Pre-PScand *skuwwan > PScand *skuggwan > ON *skuggi* ‘shadow; specter’

SaaL *snáves* (< *snāvēs) ‘short-haired’ < Pre-PScand *snawwiz > PScand *snaggwiz > ON *snøggr* ‘short-haired’

SaaN *skieddu* (< *skientō) ‘old and worn skin’ < Pre-PScand *skenþō > PScand *skinþō > ON *skinn* ‘skin’ (cf. SaaL *skidde* ‘skin (as merchandise)’ < *skintē, a later loan from PScand *skinþō)

Loans with an initial cluster of the type stop + liquid:

SaaU (obsolete) <*pruosse*> (< *pruosē) ‘severe cold’ < PScand *frozan (< *fruzan) > ON *frør* ~ *frer* ‘frost’

SaaS *kraavhtse* (< *krāvccë < *krāvttës), SaaN dial. *rákca* (< *rāvccë < *rāvttës) ‘porridge’ < PScand *grautaz > ON *grautr* ‘porridge’

SaaS *kraessjie* ~ *kraassjoe* (< *krāššē ~ *krāššō) ‘bog-bean’ < PScand *grasja > Swedish *gräs* ‘grass’

SaaS *kraevies* ‘gray’ (< *krāvēs) < PScand *grāwaz > ON *grár* ‘gray’

SaaS *provtse* ~ *provrese* (< *pruvdës), SaaN dial. *ruvddas* (< *ruvdës) ‘bride’ < PScand *brūdiz > ON *brúðr* ‘bride’

SaaS *krievvie* (< *krievvē) ‘reindeer herd’ < PScand *kreu(h)— > dialectal Norwegian *kru* ‘a small corral for cattle’

SaaS *plievvies* ‘shy’ (< *plievvēs) < PScand *bleugaz > ON *bljúgr* ‘bashful, shy’. – The substitution of PSaa *-vv- for PScand *-ug- suggests that the voiced stop was phonetically realized as a spirant [γ] in the source form.

SaaS *plaassa* (< *plāssā) 'large rock that sticks out of the ground or up from water', SaaN *lás'sá* (< *lāssā) 'flat rock; skerry' < PScand *flasja > ON *fles* 'flat rock'

SaaS *plaahkoe* 'low flat terrain' (< *plākkō), SaaN *láhku* 'wide, flat basin up in the mountains' (< *lākō) < PScand *flahu > ON *flǫ̀* 'rock ledge; gently sloping valley up in the mountains'

Abbreviations

ON	Old Norse	SaaN	North Saami
PSaa	Proto-Saami	SaaP	Pite Saami
PScand	Proto-Scandinavian	SaaS	South Saami
SaaI	Inari Saami	SaaSk	Skolt Saami
SaaK	Kildin Saami	SaaT	Ter Saami
SaaL	Lule Saami	SaaU	Ume Saami

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Formation of the Indo-European and Uralic (Finno-Ugric) language families in the light of archaeology: Revised and integrated 'total' correlations

1. Introduction

With proper methodology, linguistic data allow —to a limited extent— reconstruction of prehistoric protolanguages, charting genetic relationships between members of a language family, and discovery of prehistoric areal contacts that a given language has had with related and unrelated languages. But language units resulting from such a study cannot be precisely located and dated. Archaeological data, in turn, allow experts to define prehistoric 'cultures' that are more or less exactly datable and locatable, and to chart their genealogical and contact relationships. But the resulting units of material culture remain mute as far as the languages spoken in them are concerned, since prehistory by definition is without readable written documents. Whether linguistic and archaeological reconstructions can be successfully correlated with each other is a much-debated issue, but credible success in such an endeavour can promote understanding in both fields.

Believing that correlation of archaeology and historical linguistics is feasible, if the time depth involved is not too great, I have been doing it since the early 1970s. Starting with India and Indo-Iranian (1974), I have gradually expanded to wider spheres, revising my hypotheses when finding more satisfying solutions. Christian Carpelan, an archaeologist with a life-long specialization in North and East European cultures, has had similar interests, focused on Uralic languages. Joining forces, we attempted to trace the emergence and disintegration of Proto-Indo-European (PIE), Proto-Uralic and Proto-Aryan in a longer article published in 2001.

J. P. Mallory, in his classic book on the Indo-Europeans that came out in 1989 and in numerous papers published afterwards (1994–95; 1997; 1998; 2001; 2002), has excellently elaborated and described the methodology of properly correlating archaeology and historical linguistics, and we felt no need for extensive

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repetition (cf. Carpelan & Parpola 2001: 55–58). Still, we wanted to stress a few things, and I follow suit here. The material culture and language of a people may change very little during a long time if people stay in the same place and other people do not come to their habitats — Iceland since the early Viking Age and Nuristan and Chitral from the Late Bronze Age until about 1900 are some examples of this. But people do move, and in long-continued or intensive contact situations there can be total language shifts and more or less complete adoptions of new cultures. In principle, it is better not to assume long migrations, but there are exceptional circumstances that allow people to move quickly long distances, such as the combination of open steppe and wheeled vehicles or horses (cf. Nichols 1997: 369). Nevertheless, there must be some tangible archaeological evidence for such movements. Dating is of cardinal importance for a study like this which tries to sort out the genealogical and contact relationships between archaeological cultures (cf. Carpelan & Parpola 2001: 56–57). I have done my best to extrapolate the most credible calibrated radiocarbon dates from the most recent publications. Admittedly there is no consensus on many dates, yet there are efforts to coordinate the data. I have taken into consideration the new dates given by Parzinger (2006), Anthony (2007), Svyatko & al. (2009) and Chernykh & Orlovskaya (2010), but regrettably could not yet consult the forthcoming issue of *Radiocarbon* (vol. 54 Nr 3–4, 2012), which contains the Proceedings of the 6th International symposium "Radiocarbon and Archaeology" held in April 2011 in Paphos, Cyprus: a special session there dealt with the chronology of the Eurasian steppes and forest steppes.

In any case, in building hypotheses it is necessary to respect the data and best-informed views in both disciplines, and to opt for solutions that are credible both from archaeological and linguistic points of view. Moreover, as Mallory underlines, isolated correlations between archaeological cultures and linguistic groups are not sufficient, but all available pieces of the puzzle in both fields should be used and all should fit. Only a total solution involving a complex web (like that of an entire language family) can be convincing. Accordingly, we aimed at a comprehensive archaeological model for the development of the Indo-European and the Uralic language families.

Research has progressed since 2001, and especially in Uralic linguistics old paradigms have been questioned and important new and apparently valid points of view have been presented. Our correlations need to be revised. Originally we intended to write this paper together, but Christian Carpelan had serious reservations with the new correlations I was proposing, being reluctant to abandon his own views in favour of new ones in which he could not believe. So he decided to take some more consideration time before committing himself, but encouraged me to present my views. We intend to continue working together on a publication that is more comprehensive and better documented than the present sketch, and that contains only solutions that we both can accept.

When I sent Petri Kallio the preliminary version of this paper in June 2010, Petri in response sent me the manuscript of his own latest paper (Kallio, in press) and noted that with regard to Proto-Uralic and Proto-Finnic prehistory we had independently arrived at virtually the same conclusions. Respecting very much Carpelan's archaeological expertise, I was much troubled by his unwillingness to accept my proposal for the origins of Proto-Finnic for archaeological reasons. Therefore, searching for a different, archaeologically more credible solution that would still suit the changed linguistic framework, I proposed to Christian an alternative scenario, which he found more convincing. I thank him for a long and fruitful discussion and also for his extensive comments on the first draft of this paper. I am grateful to Jaakko Häkkinen, Petri Kallio, Riho Grünthal and Mika Lavento for their very pertinent criticism and constructive comments; and to Sergej V. Kuz'minykh for kindly keeping me abreast of recent archaeological literature published in Russia — even though at this stage I have not been able to take all of it into consideration. I am much obliged also to Jim Mallory, who kindly checked my English and gave me access to his forthcoming papers on the Afanas'evo culture.

While I have tried to keep this paper fairly concise, some major controversies on the Uralic side had to be discussed in detail. These are above all questions concerning the Proto-Finnic, Proto-Uralic and Proto-Samoyedic homelands, for which new solutions are also suggested. The last part of the paper, where the Samoyedic homeland is dealt with, has already been published separately as a contribution to a Festschrift in honour of my friend Juha Janhunen, who among many other things is a leading expert on Samoyed languages (Parpola 2012a).

Contacts with early phases of the Indo-European languages, reflected in loanwords resulting from these contacts, are crucial for dating and locating languages of the Uralic family at different stages of their development. Identification of the archaeological cultures in which the various early Uralic languages were spoken, therefore, requires recognizing, as reliably as possible, the archaeological cultures in which the relevant Indo-European languages were spoken at various stages of their development. Because archaeological cultures and languages can be correlated with more confidence on the Indo-European than the Uralic side, I first trace the formation of the Indo-European language family in the archaeological record. All main branches of the language family are dealt with, firstly, in order to demonstrate that the solution is total; secondly, because a consensus has by no means been reached, a wide variety of views being currently held; and thirdly, because my reconstruction differs on some points (notably on the Late PIE homeland) from those suggested by J. P. Mallory and David Anthony, although I largely agree with these two scholars.

For the sake of easy orientation, I mention only language groups in the section titles, and highlight the archaeological cultures correlated with the linguistic unit discussed by printing their names with ***bold face italics*** when they are first mentioned in the sections where the correlation is made. Names of archaeological cultures that need mentioning but are not directly correlated with the language(s) concerned are printed in *italics* when they are first mentioned. I concentrate on the essential data, which with regard to archaeology means the temporal and areal distribution of a given culture and its genealogical and contact relationships.

2. Formation of the Indo-European language family

The problem of Proto-Indo-European (PIE) homeland: Significant and widely supported contributions for its solution

Theodor Benfey (1809–1881), one of the leading Indo-Europeanists of his time, proposed that the PIE homeland is likely to have been in South Russia (Benfey 1869: 597–600). Otto Schrader (1855–1919), author of the still valuable *Reallexikon der indogermanischen Altertumskunde* (2nd ed., revised by A. Nehring, 1917–29), in his *Sprachvergleichung und Urgeschichte* (3rd ed., Schrader 1907 I: vii & II: 506–529) and in his summary booklet *Die Indogermanen* (3rd ed., Schrader 1919: 192–193) also came to the conclusion that the North Pontic steppes provide the most likely solution to the PIE homeland problem. Schrader noted that this location between Europe and Asia could explain the differences that exist in the agricultural and environmental vocabulary between the IE languages spoken in these two parts of Eurasia. Placing the homeland between the areas of the Uralic and Semitic languages also fits their apparent contact with PIE. One of the leading archaeologist of the first half of the 20th century, V. Gordon Childe (1892–1957), likewise opted for the same solution in his book *The Aryans: A study of Indo-European origins* (1926).

Marija Gimbutas (1921–1994) correlated the PIE language with what she called the "Kurgan culture" of the South Russian steppes, and traced its impact on the archaeological cultures of Europe on a broad scale. Gimbutas's work was insightful but her extensive and often pioneering syntheses were bound to be somewhat controversial. Her studies have been conservatively revised and carried further by her student J. P. Mallory. In his above-mentioned book *In search of the Indo-Europeans* (1989) and numerous other studies, Mallory has in many ways and in my opinion quite convincingly established that Early PIE was spoken in the Copper Age cultures of the Pontic-Caspian steppes. This conclusion has been strongly defended also by Valentin Dergachev (2007) and David Anthony (2007) in their recent books.

Early Proto-Indo-European

The key Copper Age culture ***Srednij Stog II*** in the steppe zone between the Dnieper and the Don is dated c. 4700–3400 BCE (cf. Parzinger 2006: 162–165; Rassamakin 2004 I: 172, 180–185, 204–209; Anthony 2007: 240–244; Chernykh & Orlovskaya 2010: 126). It seems to have been formed when people representing the ***Khvalynsk culture*** (c. 5000–3800 BCE) of the Volga steppes took over the local Late Neolithic *Dnieper-Donets II* culture (cf. Anthony 2007: 244–247). The Khvalynsk cemetery on the forest steppe on the Mid-Volga near Samara is dated c. 5000–4550, but the Khvalynsk culture site of Kara-Chuduk on the Lower Volga has yielded a single date c. 3800 BCE (cf. Rassamakin 2004 I: 173; Anthony 2007: 169–170, 182; Chernykh & Orlovskaya 2010: 121–129).

The Pontic-Caspian steppes count for more than 40% of the wild horse remains in Europe c. 5000 BCE. People of the Late Neolithic and Copper Age cultures of these regions not only hunted and ate the horse (at one site on the Mid-Volga 66% of the 3,602 identified bones were of horses), but also sacrificed it and made bone plaque figurines of the horse (cf. Mallory 1981; 1989: 220–221; Anthony 2007: 189–192). This is an important match with the Early PIE language, which certainly had a word for the horse. Horse is also the only animal to figure prominently in the personal names of several peoples speaking early Indo-European languages (Old Indo-Aryan, Old Iranian, ancient Greek, Gaulish Celtic, Old English), which moreover had deities associated with the horse and horse sacrifices (cf. Mallory 1981; 1989: 119, 135–137; Hänsel & Zimmer ed. 1994; Sadovski 2009). The horse was probably first kept for meat and milk and later for traction, but along with many zoologists and archaeologists I doubt that the steppe pastoralists of the Copper Age were riding domesticated horses. One reason is that pictures of riders first appear two millennia later, while the first wagons were depicted almost immediately after wheeled vehicles were invented, and the rider motif after its first introduction becomes increasingly important, especially in cultures of mounted pastoralists. Secondly, there is a clear shift from chariotry to riding c. 1500 BCE. (Cf. Parpola 2008: 27–29 with further literature; the main advocate of Copper Age riding is Anthony 2007: 193–224; cf. also, e.g., Lichardus & Lichardus-Itten 1998: 103–104.)

The Anatolian branch of Indo-European

The Khvalynsk and Srednij Stog II cultures of the Pontic-Caspian steppes belonged to pastoralists, who were in trading relations with the thriving Carpatho-Balkan agriculturalists. Together they formed the world's first great metallurgical province, where the metal production was in the hands of the agriculturalists. Closest to the steppe were the farmers of the Cucuteni-Tripolye culture (Cucuteni in Romania and Moldavia, Tripolye in Ukraine), hereafter simply *Tripolye culture* (5700–3100 BCE, cf. Chernykh & Orlovskaya 2010: 126), from which the eastern pastoralists received their metal and other prestige goods.

An early phase of the Srednij Stog II culture represented by the sites of Stril'cha Skelya, Chapli, Mariupol', Novodanilovka, and Suvorovo is called the ***Skelya culture*** (c. 4300–4000 BCE, cf. Parzinger 2006: 162; Anthony 2007: 225–262) by Yurij Rassamakin (1999; 2004). During the last quarter of the fifth millennium, Skelya pastoralists invaded the Balkans. Widely distributed Skelya type burials with characteristic Skelya grave goods are intrusive in this area. Some 600 sites of the Carpatho-Balkan cultures were abandoned, many of them burnt down, and their voluminous metal production stopped almost completely.

The surviving local cultures of the eastern Balkans were transformed into the ***Cernavoda culture*** (c. 4000–3200 BCE) with notable steppe elements in the economy, religion and now hierachical social system. It is likely to have kept the Early PIE language of the invaders.

About a millennium later the Cernavoda culture fused with fresh steppe invaders to form the ***Ezero culture*** (c. 3300–2700 BCE). The Ezero culture in turn is connected with the ***Troy I culture*** (c. 3000–2600 BCE) of Anatolia. The most widely accepted date for the intrusion of Indo-European speakers from Europe into Anatolia is about 2700 BCE. Then, in western and southern Anatolia, more than a hundred Early Bronze Age II (c. 2600–2250 BCE) sites were abandoned and all major sites destroyed, while Troy V (c. 2000–1800 BCE) type ceramics spread eastwards along with the megaron type architecture.

(On the Skelya invasion to the Balkans and the Anatolian connections, cf. Gimbutas 1977; Mallory 1989: 28–29, 109, 233–239; Chernykh 1992: 52; Lichardus & Lichardus-Itten 1998; Dergachev 1998; 2002: 94; 2007; Rassamakin 1999: 100–106; Carpelan & Parpola 2001: 64; Parpola 2008: 33–34; Anthony 2007: 225–262.)

This archaeological succession of cultures provides a credible trail from the North Pontic steppes to Anatolia. Indo-Europeanists are agreed that the first branch to separate from PIE is the Anatolian one: it comprizes Hittite, Luvian and Palaic —which have been recorded since the 16th century BCE— and their successors; all these IE languages of Anatolia died out in antiquity (cf., e.g., Meier-Brügger 2002: 24–26, 40–41; Fortson 2004: 154–179).

The Indo-European vehicle terminology of the Anatolian languages is partly different from most of the Late PIE vehicle terms supposed to have come into being when wheeled vehicles were invented. This may be due to their belonging to the very earliest wagon owners to leave the Pontic steppes. Thus Hittite *hurki* 'wheel' has a cognate only in Tokharian (A nom. sg. *wärkänt,* B obl. sg. *yerkwantai* 'wheel'), but as they have different suffixes, both may have evolved independently from the PIE root *$*H_2werg$-* 'to turn (around)' (cf. Oettinger 1994: 74; LIV 1998: 259). Hittite *zalti-* 'chariot' is considered a loanword from (Hieroglyphic) Luwian *zalal(a)-* 'wagon, cart' (cf. Oettinger 1994: 74), which Ivanov (1999: 28–30) derives from the PIE root *$*k^wel$-* 'to turn (around)', from which, with or without intensifying reduplication, many Indo-European languages have derived words for 'wheel' and 'wagon' (cf. Parpola 2008: 4–5). However, Martin Kümmel (pers. comm. 2012) notes, other Anatolianists find it difficult to believe that PIE $*k^w$ was palatalized into Luwian *z*; the available evidence rather points to the preservation of labiovelars before front vowels (and to later palatalization in Lycian only). Many of the other Anatolian vehicle terms may be loanwords from Mitanni Proto-Indo-Aryan, as horse-drawn chariots were invented by Proto-Indo-Aryan speakers in the Ural steppes and brought by them to the Near East, and the Mitanni-Aryan Kikkuli wrote a manual for training chariot horses for the Hittites (cf. e.g. Hieroglyphic Luwian *wa-za-* 'to drive' and Proto-Indo-Aryan **vajhati*; Hittite *tu-u-ri-ia-* 'harness' and Old Indo-Aryan *dhur-* 'that part of the yoke which is placed on the shoulder of the draught-animal').

Late Proto-Indo-European

Instead of the most widely supported archaeological correlation of Late PIE with the *Yamnaya (Pit Grave) culture* (c. 3300–2500 BCE) (cf. Mallory 1989: 210–215; Anthony 2007: 299–339 & fig. 5.1 on p. 84), I have suggested correlating Late PIE with the ***Late Tripolye culture*** (Parpola 2008). By Late Tripolye, I mean the phases B2 and C1, c. 4000–3400 BCE; the Tripolye culture disintegrated in the already Post-Tripolye phase C2 c. 3400–2900 BCE. When the Skelya pastoralists invaded the Balkans (cf. above), they also subdued their western neighbours, the Tripolye people, without however destroying their culture. In this Tripolye B1 phase (c. 4300–4000 BCE), a large number of Tripolye settlements became fortified, suggesting that they were being attacked. At the Tripolye B1 site of Drutsy 1, more than a hundred steppe-type flint arrowheads were found around the walls of the three excavated houses (cf. Dergachev 2002: 105–107; Anthony 2007: 230–231).

Drutsy 1 also had "Cucuteni C type" ceramics decorated with cord impressions; it is identical with the Skelya ceramics of the steppe, and differs in every respect to the traditional beautiful Tripolye painted pottery. This intrusive ware appeared at first sporadically in a number of settlements, then with increasing frequency until it became the predominant ceramic in the final phase of the Tripolye culture (cf. Müller-Karpe 1974: I, 349; Mallory 1989: 235–236; Rassamakin 1999: 77–79; Anthony 2007: 231–234, 489; Parpola 2008: 40).

Some of the Tripolye sites first having this steppe type pottery also produced knobbed maces (a few of them representing a horse's head), which spread from the steppe to the Balkans and the Tripolye area 4300–4000 BCE (cf. Mallory 1989: 234–235; Govedarica & Kaiser 1997; Rassamakin 1999: 79–81; Dergachev 2007: 144; Anthony 2007: 234; Parpola 2008: 38–39). These sceptre-weapons were symbols of power, very probably reflecting the spread of a new type of social organization —strongly hierarchical chieftainship— which was instrumental even in the further spread of the early IE language (cf. Anthony 1997; 2007: 118; Mallory 2002: 34–35). Effective new leadership may explain the invigoration of the Tripolye culture, which expanded towards north and east, and created ever larger towns. There were now also internal strifes between rivalling eastern and western parts of the Tripolye culture.

The most important diagnostic means for the archaeological identification of Late PIE is the vocabulary connected with wheeled vehicles (Figure 1): on the one hand this implies that the speakers of Late PIE knew wheeled vehicles, and on the other hand it dates the disintegration of Late PIE after the invention of wheeled vehicles, the date of which might be deduced from the archaeological record. Nevertheless, it has been much debated where and when the invention actually took place. The old hypothesis of origins in the Uruk culture of Mesopotamia around 3500–3300 BCE has prevailed until recently, but finds of comparable date have been made not only in West Asia but in many places in Europe as well. Josef Maran (2004b) has pointed out that the marshlands of Sumer

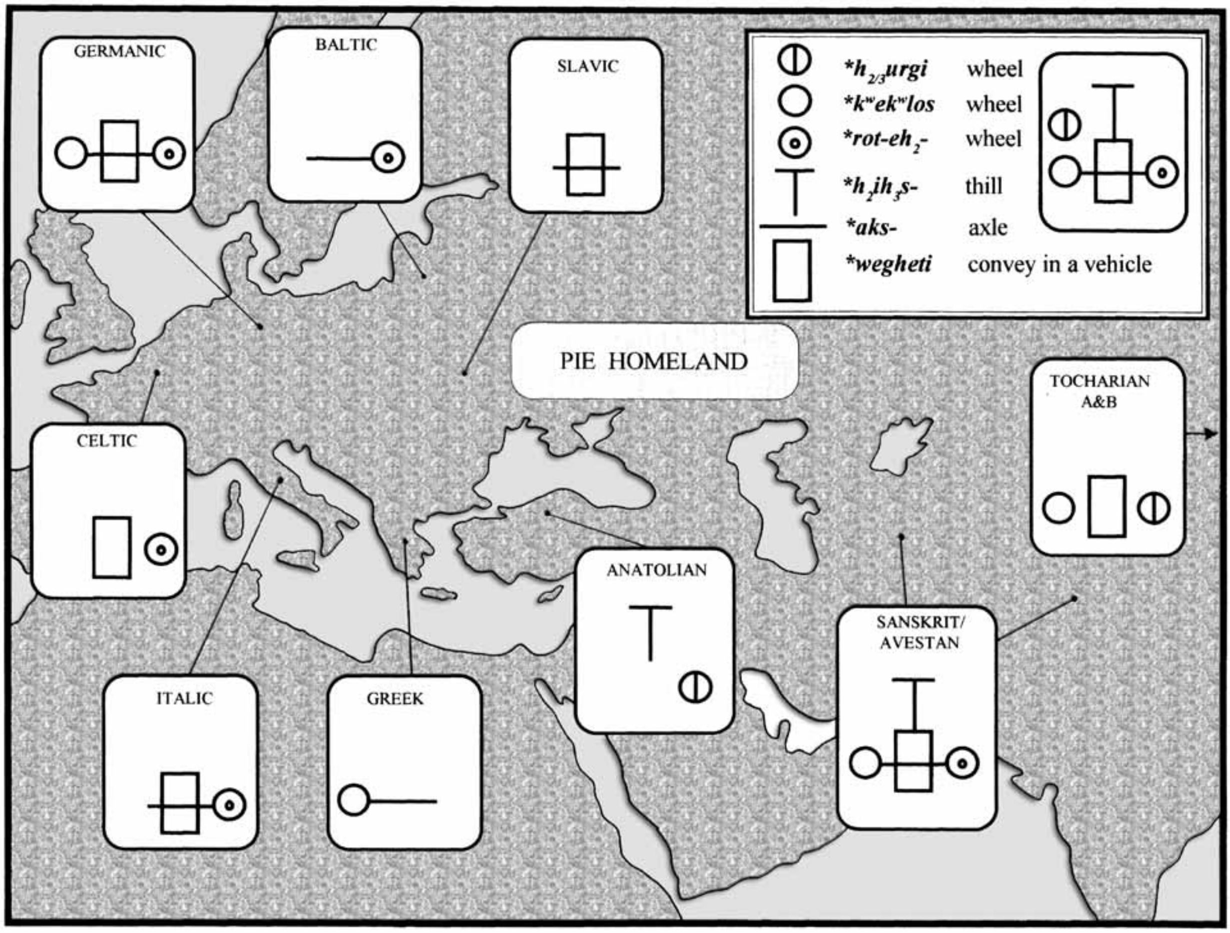

Figure 1. Vocabulary of wheeled vehicles in Indo-European languages. After Anthony 1995: 557, fig. 1. For a detailed study of this topic, see Parpola 2008.

are not a favourable terrain for wheeled vehicles; sledges, which are likely to have preceded wagons, work there much better, and did indeed long prevail in Mesopotamia.

As the most likely place of origin for wheeled vehicles Maran has suggested the Late Tripolye culture, which alone anywhere in the world has evidence (in the form of wheeled drinking cups with ox protomes) of wagons predating 3500 BCE (for drawings of the principal evidence, see Parpola 2008: 12–21). Between 4000 and 3400 BCE, the Late Tripolye culture was the most thriving and populous agricultural community in the Copper Age world, cultivating extremely fertile black soil, and having villages that measured hundreds of hectares and that housed up to 15,000 people. People needed means of transport, and in addition to the wheeled wagon models some fifty sledge models have also been recovered (cf. Balabina 2004). In addition, the local forest steppe offered both large trees for the construction of primitive solid wheels and ground suitable for traffic.

The hypothesis that the wheeled vehicles were invented in the Tripolye culture after it had been taken over by PIE speakers and then largely assimilated linguistically, gives a satisfactory explanation to the puzzling question (cf. Izbitzer 1998 and Anthony 2007: 34) where did the PIE get its vehicle terminology from. As the inventors of this new technology, they invented the terms themselves, and this is borne out by the fact that practically all the twelve different etyma are derived from native PIE verbal roots (for detailed evidence, see Parpola 2008: 4–9). There is a marked contrast with the vehicle terms of peoples who have borrowed the technology: for instance in Finnish they are practically all Indo-European loanwords (cf. Parpola 2008: 9; on 'wheel' in Uralic languages at large, Grünthal 2008).

Expansions of Late PIE

While there is fair agreement concerning the Anatolian branch as the first language group to separate from the PIE unity, the same cannot be said of the construction of a family tree for the other branches of the Indo-European language family (cf., e. g., Clackson 2007: 1–26; Blažek 2007). The reason seems to be that the Late PIE language disintegrated explosion-like in all directions: the best 'family tree' in my opinion is that proposed by Calvert Watkins (1998: 33) (Figure 2). The Late Tripolye culture situated around 30 degrees longitude and 50 degrees latitude is very nearly in the middle of the "centre of gravity" of the Indo-European languages (Figure 3).

Most importantly, when the Late Tripolye culture actually dissolved in the terminal C2 phase (c. 3400–2900 BCE), it gave way not only to local Post-Tripolye cultures but also created new cultures all around that share basic

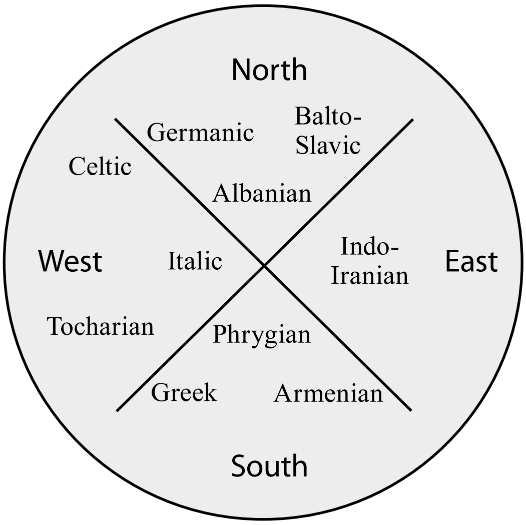

Figure 2. Relations between the main branches of Indo-European according to Calvert Watkins (1998: 33, fig. 2.1).

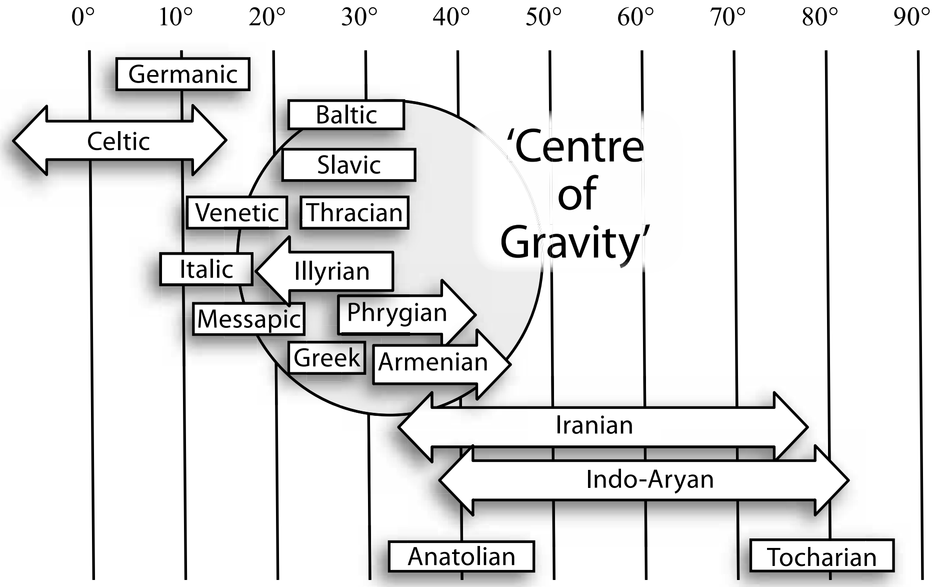

Figure 3. The 'centre of gravity' in the distribution of the Indo-Eurpean languages according to J. P. Mallory (1989: 153, fig. 83).

components of Tripolye and steppe origin. And these new cultures spread to those very regions where the various Indo-European languages first make their appearance, or, as in the case of Indo-Iranian, a good way along the route leading to those appearances. It is assumed that climatic change influenced the transformation of the Late Tripolye culture of thriving settled farmers (with significant animal husbandry) into several cultures of more mobile pastoralists. Tens of thousands of people started moving with cattle and ox-drawn wagons into all directions, becoming superstrata of various earlier local cultures and bringing about a language shift (cf. Kohl 2004; 2007: 23–54; Anthony 2007: 346–359; Parpola 2008).

In 1997, Johanna Nichols posed the question: why does Indo-European have so many branches? According to her, "[m]ultiple branching at or near the root of a [family] tree points to abrupt dispersal in a large spread" (Nichols 1997: 371). "Like many profound questions, this one is both shockingly obvious and disturbingly obscure", observed Andrew Garrett, who found it "hard to see what single event would split one speech community into ten" (Garrett 1999: 146–7). I trust the above sketched scenario provides a satisfactory explanation for such a split. The disintegration of Late PIE was a sudden, explosion-like event, which took the language into all directions and thus prepared the ground for a split into many different branches. The validity of this view is not contradicted — rather the opposite — by Garrett's insightful and persuasive demonstration that the spreading Late PIE probably remained relatively uniform over wide areas for some time and that the emergence of the various "branches" resulted from later local developments:

> “What I am saying is this: there is no clear evidence for a historical – that is to say, in the technical linguistic sense of the term, a genetic – Celtic or Italic or Greek subgroup of Indo-European. These do not correspond to nodes on an Indo-European Stammbaum. On the contrary, sometime in the third or second millennium BCE, the Indo-European dialects of western and southern Europe formed a continuum. This contained the ancestors of Celtic, Italic, and Greek, as well as Venetic and the other ‘minor’ languages of the area, and no doubt other dialects that are now lost. But there is no reason to assume that the ancestors of the later Celtic or Italic languages, or of the Greek dialects, shared any exclusive set of innovations defining them as distinct subgroups of Indo-European. In short, according to the view I am advocating, the formation of a Celtic subgroup of Indo-European, the formation of an Italic subgroup, and even the formation of ‘Greek’ itself may have been secondary Sprachbund phenomena: local responses to areal and cultural connections that could very well have arisen in Greece, on the Italian peninsula, and in western and central Europe.” (Garrett 1999: 152–153; cf. also Garrett 2006).

Northwest Indo-European

The earliest influence of the Late Tripolye culture in northwestern Europe can be seen in the first local farming culture, the ***Funnel Beaker or (Trichterbecher =) TRB culture*** (c. 4000–2500 BCE), which originally hardly spoke an Indo-European language. In the form of drawings on pottery and cart-tracks on the floor of a long earthen barrow, there is evidence that the TRB culture had ox-wagons in both Poland and Schleswig-Holstein around 3500 BCE (cf. Bakker 2004). In Jutland and southern Sweden, the TRB burials changed from Megalithic barrows (c. 3500–3100 BCE) into cairns (c. 3100–2800 BCE) that contain remains of pairs of draught-cattle (cf. Johannsen & Laursen 2010). The TRB culture was then in Poland transformed into the ***Globular Amphora culture*** (c. 3000–2350 BCE), which expanded both westwards and southwards (cf. Mallory 1989: 243–257; Parpola 2008: 45–48).

Starting around 3200 BCE, probably from the Post-Tripolye Middle Dnieper and Sub-Carpathian cultures (cf. Carpelan & Parpola 2001: 65–66; Anthony 2007: 380–382), the ***Corded Ware (or Battle Axe) cultures*** (c. 3100–2300/2000 BCE) spread within a couple of centuries over a vast area, spanning from the Netherlands to the coasts of Finland and to the Upper Volga (cf. Mallory 1989: 243–257; Carpelan & Parpola 2001: 64–68; Cunliffe 2008: 167–169 & 203–205; Anthony 2007: 367–368). Furholt (2003) has pointed out that while the burial mode spread to western Europe and southern by 3000 BCE, the Corded Ware itself followed only about 200 years later — in 3000 BCE it was not found west of Poland. In Finland, the calibrated beginning date is 3200/3000 BCE (cf. Salo 1997: 9, based on datings by Högne Jungner). In the Upper Volga region, the ***Fat’yanovo culture*** (c. 2800–1900 BCE) (cf. Krajnov 1987b) belongs visibly to the Bronze Age from around 2300 BCE when it started having a metal-working ***Balanovo*** extension as far east as between the mouths of the Oka and Kama rivers (cf. Chernykh 1992: 133–139; Bader & Khalikov 1987). Presumably the language of the Corded Ware people (who were mobile pastoralists) was Proto-Northwest-Indo-European, the common ancestor of the later Celtic, Italic, Germanic and Balto-Slavic branches, which was still quite close to Late PIE (cf. Oettinger 1997; 1999; 2003; in press).

On the basis of their rapid spread to the areas where various branches of Indo-European were spoken in historical times, the Corded Ware cultures have long been connected with the early expansion of IE languages, but it has been difficult to reconcile this with the assumption that Late PIE was spoken in the Yamnaya cultures (cf. Mallory 1989: 243–257). This obstacle largely vanishes with the correlation of Late PIE with the Late Tripolye culture.

The TRB culture, the Globular Amphora culture and the Corded Ware cultures all had carefully manufactured drinking vessels in their elite graves, which also contained wagons and stone battle axes. These are all symbols of power witnessing a hierarchical social order that apparently spread via the Late Tripolye culture from the Skelya pastoralists. In the *Baden culture* (c. 3500–3000 BCE) of Central Europe, several drinking cups had the shape of a wheeled wagon, which, as suggested by Maran (2004a), developed from earlier Tripolye models. It is a fair assumption that the European Early Bronze Age elites shared privileged rituals of drinking alcohol (cf. Sherratt 1987; 1996; Parpola 2008: 45–48).

Celtic branch

From about 3700 BCE, starting from the Netherlands, in a western zone that continued via Jutland to southern Sweden, the TRB people buried their dead in megalithic collective tombs. The TRB people adopted this burial type as well as navigation from the earlier Neolithic culture of the Atlantic coasts that built megalithic graves and had a maritime network that span from the British Isles to the Iberian peninsula, France and the Netherlands (cf. Cunliffe 2008: 159–167).

The immigrant Corded Ware people who came to the Netherlands by 2800 BCE, adopted and continued the local maritime traditions and therewith spread overseas. Theirs became yet another drinking-vessel complex of elite graves, that of the Bell Beakers. The ***Bell Beaker culture*** (c. 2800–1400 BCE), along with characteristic weapons, is widely distributed in westernmost Europe including the British Isles, France and the Iberian peninsula (cf. Cunliffe 2008: 203–213). Uniformity in various kinds of elite feasting gear (cf. Cunliffe 2008: 255 with fig. 8.15), among other things, connects these same regions during the Late Bronze Age c. 1300–800 BCE. These Bronze Age Atlantic coastal cultures, connected with the Corded Ware tradition of the Netherlands, perfectly match the Atlantic distribution of the emerging Celtic branch of Indo-European (cf. Cunliffe 2008: 254–258). Shortly before 500 BCE, Celtic speaking elites expanding eastwards from the west coast took into their control the Central European *Hallstatt culture* (c. 800–500 BCE) and transformed it into the warring ***La Tène culture*** (c. 500–0 BCE), with which Celtic raiders crossed Europe from west to east, eventually reaching as far as Anatolia and the Pontic steppes (cf.

Cunliffe 2008: 354–362). This scenario offered by Cunliffe explains the insular and Iberian distribution of Celtic better than the generally maintained derivation of the Celtic speakers from the Hallstatt culture (for which see Mallory 1989: 105–107).

Italic branch

The ***Hallstatt culture*** (c. 800–500 BCE), supposedly taken over by Celtic speakers, is descended from the extensive Central European ***Urnfield cultures*** (c. 1300–700 BCE), which via the ***Tumulus culture*** (c. 1600–1200 BCE) and the ***Únětice (Aunjetitz) culture*** (c. 2300–1600 BCE) go back to the *Corded Ware* and *Globular Amphora* cultures (cf. Gimbutas 1965: 245–388). The Urnfield complex included the ***Villanovan culture*** (c. 1100–500 BCE) of Italy. On the basis of this expansion to Italy, part of the Urnfield cultures can be assumed to have been linguistically related to the Italic branch of Indo-European. Otherwise the language(s) spoken in the Urnfield cultures seem to have vanished in the expansions of the Celtic, Germanic, Balto-Slavic and Iranian branches. This agrees with the isoglosses Italic has with Illyrian, Celtic and Germanic branches (cf. Porzig 1954: 97–134).

There are other intrusive Bronze Age cultures in Italy that have been considered as possible introducers of the Italic branch of Indo-European, but their areas do not give as good a match as the Villanovan culture: these are the *Remedello culture* (c. 3300–2500 BCE) in the Po Valley and the *Rinaldone culture* (c. 3500–2500) in Tuscany (cf. Mallory 1989: 91–94; Mallory & Adams ed. 1997: 314–319).

Illyrian and other little known branches

The poorly attested Illyrian was in antiquity an important Indo-European language in the Balkans, and it is widely believed to survive in the Albanian language (cf. Mallory 1989: 73–76; Fortson 2004: 405–406 and 390). Place names have given rise to speculations that Illyrian was once spoken wider in eastern central Europe (cf. Vasmer 1971: II, 535–578). At the site of Maliq in Albania, there is a clear cultural change from the locally rooted Chalcolithic period IIb to the Early Bronze Age period IIIa, when new cruder types of ceramics appear, followed by likewise intrusive tumulus burials. These developments are undoubtedly connected with the two invasions of steppe pastoralists into the Balkans discussed earlier that brought Early and Late PIE to these parts. Both Albanian and Yugoslav archaeologists are agreed that there is fairly direct cultural succession from the Early Bronze Age to the Iron Age and historical times in the western Balkans, though the area has a complicated history with profound influences received from many directions (cf. Mallory 1989: 75–76).

Thracian, whose speakers in the eastern Balkans once were among the most populous on earth (cf. Herodotus 5,3), and Dacian spoken in present-day Romania, have left so few testimonia that it is barely possible to recognize their

Indo-European affinity. These and other less known branches of Indo-European have vanished in the linguistic assimilations following the expansions of other linguistic groups. (Cf. Mallory 1989: 72–73; Fortson 2004: 400–411).

Germanic branch

The ***Nordic Bronze Age culture*** (c. 1750–600 BCE) in the Jutland peninsula up to Schleswig-Holstein and southern Scandinavia goes back to the local Corded Ware culture, which from about 2800 BCE replaced the cairns of the TRB culture in these parts. This is the generally assumed homeland of the Germanic branch of Indo-European (cf. Ramat 1998). In the Early Iron Age, the Nordic Bronze Age culture expanded southwards, to form the ***Jastorf culture*** (c. 600–0 BCE) of northern Germany between the Rhine and the Oder. This is close to the location of the Germanic tribes described by Tacitus in his Germania in 98 CE (cf. Mallory 1989: 84–87; Wikipedia s. v. Jastorf culture). The Nordic Bronze Age culture exerted a strong influence on coasts of Finland and on Estonia, especially the western island of Saaremaa c. 1500–500 BCE (cf. Salo 1997: 14–17; Kriiska & Tvauri 2007: 96–116); these areas may have been bilingual at this time, with a Proto-Germanic speaking elite. The East Germanic Goths originally came from Sweden and moved from the East Baltic to the Black Sea in the late second century CE. The Germanic loanwords have had a very important role in the study of the historical development of the Uralic languages of the Baltic region and Fennoscandia (cf. Posti 1953; Hofstra 1985; Koivulehto 1999a; 1999b; Aikio 2006; Kallio in this book).

Slavic branch

The expansion of the Slavic speakers from their late (Iron Age) homeland between the Upper Vistula, the Upper Dniester and the Upper Dnieper to eastern central Europe and to the Balkans took place as late as c. 400–700 CE (cf. Kiparsky 1963: 13–15; Gimbutas 1971: 98–132 with the map in fig. 43 p. 107; Andersen 1998: 415–423 with maps 14.1–3). The Proto-Slavic unity disintegrated with the 375 CE victory of the Huns over the Goths, who are supposed to have ruled the hybrid ***Chernyakovo culture*** (c. 200–400 CE). The majority of the Chernyakovo population descended from the "Scythian farmers", who according to Herodotus (4,20) were subservient to the Iranian-speaking nomadic "Royal Scythians"; the "Scythian farmers" have been convincingly identified with Proto-Slavic speakers (cf. Pekkanen 1968 for a penetrating study of the classical sources; in addition comes the testimony of Slavic place names, on which see Vasmer 1971 and Trubachev 1985; cf. also Gimbutas 1971: 22; Mallory 1989: 80–81; Andersen 1998: 417). The habitats of the "Scythian farmers" are archaeologically equated with the ***Chernoles culture*** (c. 750–200 BCE) (Figure 4 no. 4). The Chernoles culture goes back to the ***Komarov culture*** (c. 1800–1200 BCE) of much the same regions (cf. Artemenko 1987b), and the Komarov culture has developed from the *North/Sub-Carpathian Corded Ware culture* (c. 3200–1800 BC) (cf. Artemenko

1987a; Anthony 2007: 377–380), which succeeded the Late Tripolye culture in this area (cf. Gimbutas 1971: 27–57, who speaks of *North Carpathian tumulus culture* instead of *Middle Dnieper Corded Ware*; and Mallory 1989: 76–84).

Baltic branch

Ancient Baltic hydronyms cover an area that includes the Upper Dnieper area and extends approximately from Kiev and the Dvina to Moscow (cf. Toporov & Trubachev 1962; Tret'yakov 1966: 286–300; Trubachev 1985; Mallory 1989: 81–84; Schmalstieg 1998: 456). It suggests the Baltic affinity of the ***Zarubinets and Yukhnovo cultures*** (c. 200 BCE – 100 CE) and the preceding ***Milograd*** and ***Plain Pottery cultures*** (c. 600–200 BCE), which have been considered Proto-Baltic along with such related cultures as those distinguished by the ***'Face-Urn' & 'Bell-Grave'*** (c. 600–300 BCE) in Pomerania, and ***'Brushed Pottery'*** and others in Latvia and Lithuania (c. 600–400 BCE) (cf. Gimbutas 1963: 75–108).

Sergej Kuz'minykh (2006: 82–83) sees Proto-Baltic speakers in cultures of "hatched ceramics" (*shtrikhovannaya keramika*) of the final phase of Early Iron Age (c. 400/300 BCE to 500/600 CE) between the Baltic Sea and Moscow, including the Upper Oka, Dnieper-Dvina, Yukhnovo and Milograd cultures. Kuz'minykh's map 3 includes also Estonia among the "hatched ceramic" cultures; this Ilmandu style ceramic of Estonia, which is similar to the Morby Ware of Finland, is correlated by me below with Proto-Baltic Finnic. The D'yakovo culture, which continues the Netted Ware cultures that Kuz'minykh connects with the western Finno-Ugric speakers, may at this stage in his opinion already be part of the Baltic world: "The 'textile' heritage was kept only on the eastern and northeastern periphery of this culture, in the Yaroslavl and Kostroma Volga regions, and to the east of Volga."

The above Iron Age cultures go back to the ***Baltic Late Bronze Age culture*** and Middle Bronze Age ***Trzciniec-Sosnitsa complex*** (c. 1800–1200 BCE), and ultimately the Baltic and the Upper/Middle Dnieper Corded Ware complexes. The Balto-Slavic unity seems to have started to differentiate in the Middle Bronze Age: "The Trzciniec and Komarov complexes were indeed related, but each possessed individual ceramic styles and types of metalwork, and their burial rites were somewhat different. The Trzciniec people inhabited flatlands and forested areas while the Komarov people lived in the plateau area. In both regions parallel lines of development can be observed throughout the Bronze and Early Iron Ages." (Gimbutas 1971: 35–36).

It seems likely to me that also Estonia and the coasts of Finland had a mainly Proto-Baltic speaking population until the Early Iron Age, directly descended from the people of the local Corded Ware who spoke Northwest Indo-European. I suppose that this substratum was the source of the large number of Baltic loanwords connected especially with agriculture and animal husbandry in the Finnic languages (on these, cf. Suhonen 1988; Junttila 2009, and in this book). This will be discussed in more detail below while dealing with the Uralic languages (cf. also Kallio 2007: 244–246; 2008).

Southeast Indo-European

In its final C phase, the Tripolye culture expanded to the Pontic steppe and eventually (in C2 phase) differentiated into a number of regional ***Post-Tripolye cultures*** (Horodistea-Foltesti, Kasperovtsy, Usatovo, Gorodsk, Sofievka) (c. 3400–2900 BCE) (cf. Anthony 2007: 346–360). In the steppe these fused with the various ***Late Srednij Stog II cultures*** (Stogovska, Kvitanska, Dereivka, Nizhne-Mikhailovka, c. 4000–3400 BCE) (cf. Parzinger 2006: 163–165). This resulted in the formation of the ***Yamnaya (Pit Grave) cultural complex*** (c. 3200–2500 BCE) (cf. Parzinger 2006: 241; Anthony 2007: 300–339, 361–368), which eventually extended from the Danube to the Urals (on the Yamnaya cultures and their formation see especially Rassamakin 1999: 113–124 and Anthony 2007: 311–321). A large number of wagon graves belonging to the Yamnaya horizon have been found, attesting to a pastoral economy based on mobility (cf. Anthony 2007: 312–322). Penetrating deep into the Danube Valley and the Balkans in the west (cf. Mallory 1989: 238–243; Anthony 2007: 361–367), it formed the "Circumpontic interaction sphere", which can be correlated with the later emergence in these regions of various branches of the Indo-European language family. The Yamnaya cultures can be said to have spoken variants of "Southeast Indo-European", which was still close to Late PIE, but undoubtedly soon split into a number of local dialects.

The different substrata must have contributed to a diversification, especially in the west with fewer substrata of Indo-European origin. The Yamnaya cultures of the Pontic-Caspian steppes probably remained more conservative and unified, since the substratum languages here (those of Late Srednij Stog II cultures) can be expected to have been slightly later forms of Early PIE (the assumed language of Early Srednij Stog II). The last-mentioned substrata may have had an archaizing effect (leaving traces of laryngeals which were probably lost in the assumed Late PIE of the Tripolye area).

Greek and Armenian branches

While the ancestors of the later Indo-Iranian branch are likely to have inhabited the eastern half of the Yamnaya cultures, more or less the original PIE homeland, it seems likely that the ancestors of the later Armenian and Greek branches stayed next to them on the western side, in the Post-Tripolye C2 ***Usatovo culture*** (c. 3300–2800 BCE) and in its Yamnaya continuation (c. 2800–2400 BCE) in the steppes between the Lower Dniester and Prut Rivers (on the Usatovo culture, which had trade links with the Balkans and the Aegean, cf. Mallory 1989: 237–238 and especially Anthony 2007: 346–360, 363). Anthony (2007: 360 and 2008) links the Usatovo culture with the origins of the Germanic branch. Yet Anthony (2007: 369) too observes that "Pre-Greek ... shared many traits with pre-Indo-Iranian. This linguistic evidence suggests that Pre-Greek should have been spoken on the eastern border of southeastern Europe..."

The Indo-European dialects later becoming Greek, Armenian and Indo-Iranian seem to have formed a linguistic area during a considerable time, for these branches share innovations in word derivation and grammatical markers (such as the augment), as well as poetic formulae (cf. Porzig 1954: 155–163; Fortson 2004: 181). The change of PIE syllabic nasals into **a* was long considered to be an isogloss uniting Greek and Indo-Iranian. It is true that in Attic and most other dialects of Greek the syllabic nasals have become *a,* but in Mycenaean Greek, as in the later Arcadian dialect of Greek, they have normally become *o* (cf. Schmitt 1977: 86 & 115); in Armenian, they have become *am* and *an* (cf. Schmitt 1981: 52–53).

The Greek speakers are supposed to have come to Greece in two or three waves. The most widely suggested conjunction for the coming of the first wave is the shift from Early Helladic II to ***Early Helladic III*** around 2300 BCE, when EH II sites in Corinthia and the Argolid are destroyed and abandoned, and new types of architecture (apsidal houses), burials (tumuli), weapons (perforated stone hammer axes) and pottery (Minyan Ware) are introduced (cf. Mallory 1989: 70–71; for a detailed and critical analysis of the various proposals and the evidence on which they are based, see Forsén 1992). David Anthony's candidate for Pre-Greek is the early western Catacomb culture, but he notes that it cannot be shown to have migrated westwards towards Greece. The golden death masks of the kings buried in the shaft graves of Mycenae is quite likely to have its origin in "the custom of making masks for the dead ... common on the Ingul River during the late Catacomb culture" (Anthony 2007: 369; in the Catacomb culture, the death masks were made of clay, cf. Shishlina 1989).

The horse-drawn chariot was developed in the Sintashta culture in the South Ural steppes at the end of the third millennium BCE, and it spread quickly east and west. Cheek pieces of the steppe style are known from Mycenae, too. The horse chariot, swords and status burials under a barrow mound were probably introduced via Albania by a small body of intruding warriors, who gave rise to the sudden emergence of ***Mycenaean chiefdoms,*** which flourished during the Late Helladic period, c. 1650–1100 BCE (Cf. Mallory 1989: 69–70; Usachuk ed. 2004; Bochkarev & al. 2010).

The last major wave is associated with the collapse of the Mycenaean civilization around 1300 BCE. The general unrest of these times, which pushed from the Balkans the Dorians to Greece and the Armenians to Anatolia, was undoutedly connected with the large-scale adoption of riding, first in the Proto-Iranian speaking *roller pottery (valikovaya keramika) cultures* (Figure 4)*,* which expanded towards the west, east and north from the Pontic-Caspian steppes around 1450 BCE. The Dorians seem to have introduced riding into Greece along with their cult of the divine horsemen Kastor and Poludeukes, who had their human counterparts in the dual kings of Sparta. These Dorian divinities correspond to the Indo-Aryan Aśvins alias Nāsatyas, personifications of the two-man team of the horse-drawn chariot (cf. Parpola 2005a: 6–12.). Igor D'yakonov connected Proto-Armenians with the people called Muski whom the Assyrians in 1165

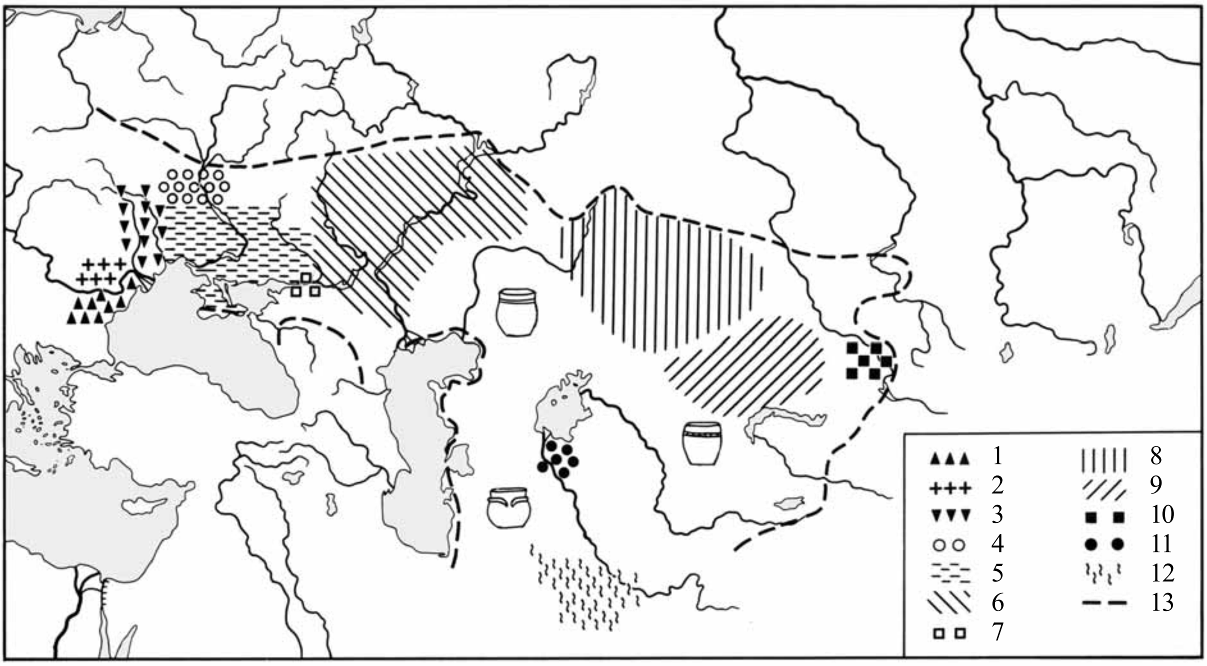

Figure 4. Distribution of the 'roller pottery' (*valikovaya keramika*) cultures. Individual cultures or types of sites: (1) Pshenichevo-Babadag; (2) Coslogeni; (3) Noua and Moldavian 'Thracian Hallstatt'; (4) Belogrudovka and Chernoles; (5) Sabatinovka and Belozerka; (6) 'Srubnaya-Khvalynsk' — basins of the Don, Volga and eastern Ural regin; (7) Kobyakovo; (8) Sargary culture or Sargary-Alekseevka-Zamaraevo type; (9) settlements of the Beghazy-Dandybai type; (10) sites of the Trushnikovo type; (11) Amirabad; (12) Yaz I—Tillya-tepe-type sites; (13) inferred borders of the 'rolled pottery' community. (After Chernykh 1992: 236, fig. 79.)

BCE said to have an army of 20,000 men on the Upper Euphrates. At this time many Anatolian sites suffered destructions, and *Muski* resembles the Georgian name for the Armenians, *(Sa)mekhi,* as well as the place names *Mysia* in Asia Minor and *Moesia* in the Balkans. (Cf. Mallory 1989: 34–35.)

Tokharian branch

The spearhead batch of the Yamnaya-related eastward movement reached as far as southern Siberia and Mongolia, founding there (chiefly between the Minusinsk Basin of the Yenisei River and the Altai mountains) the ***Afanas'evo culture***, dated c. 3100–2500 BCE (cf. Parzinger 2006: 191; Anthony 2007: 314), while samples taken from human bone have yielded dates between c. 2750–2450 BCE (cf. Svyatko et al. 2009: 247). This culture is very similar to the early Yamnaya cultures in many respects: especially the supine position of the body with legs flexed (typical even of the Khvalynsk and Srednij Stog cultures), the use of ochre, pointed based vessel, copper knife and awl. The main reason why the connection has been questioned is those about 1500 km that separate Afanas'evo from the easternmost Yamnaya groups. However, with the help of ox-wagons it would have been possible to cover the distance in a couple of years when the grass steppe was still uninhabited. The roof covering one Afanas'evo grave at the recently excavated site of Khurgak-Govi in Mongolia, radiocarbon-dated to c. 2900–2500 BCE, is interpreted as a wagon chassis (Kovalev n.d.; Mallory n.d.). Besides, some related intermediate sites such at Karagash near Karaganda (cf. Evdokimov & Loman 1989) have been found.

The Tokharian languages spoken in the first millennium CE in eastern Turkestan (Xinjiang) have been supposed to descend from the language of the Afanas'evo culture (cf. Mallory 1989: 223–227; Mallory & Mair 2000: 121–123, 270–318; Anthony 2007: 307–311). Tokharian has retained many very archaic features of Proto-Indo-European, and is widely considered to be the next oldest branch after Anatolian. It has been placed in the western quadrant in Calvert Watkins's diagram of the dialectal affinities (Figure 2), undoubtedly because Celtic, as the spearhead of the western periphery, also separated early from the Late PIE unity. Tokharian has not participated in the satemization that affected among others the Indo-Iranian languages before they spread widely to Kazakhstan and Siberia around 2000 BCE, so Tokharian must have come to these parts earlier.

Mallory (in press) now finds serious reasons to doubt the Afanas'evo ancestry of the Tokharian languages: for one thing, Tokharian has preserved PIE agricultural vocabulary, but the Afanas'evo people did not practise agriculture. The Afanas'evo language, therefore, was probably Para-Tokharian. The fourth phase (c. 2500–2000 BCE) at ***Sarazm*** in the Zeravshan Valley of Tajikistan, has notable Afanas'evo-like intrusive elements coming from the northern steppes, but there is no evidence of its connection with Xinjiang, although it is situated on one of the main gates to Xinjiang. (On Sarazm IV, cf. Parzinger 2006: 234–5, 329–332; Isakov 1993; Lyonnet 1996; Avanesova & Dzhurakulova 2008).

Indo-Iranian (Aryan) branch

The Indo-Iranian or Aryan branch of Indo-European seems to have evolved in the steppe and forest steppe cultures that succeeded the Yamnaya culture (3200–2500 BCE) east of the Dniester River. This conclusion is based on the fact that the successive cultures descend from each other being also fairly similar pastoralist cultures from the Early Bronze Age to the Early Iron Age, while both the earliest traces (in loanwords in Uralic languages) and in historical records (of Scythians) point to Indo-Iranian as having been spoken in this vast area.

After the collapse of the Carpatho-Balkan Metallurgical Province around 4000 BCE, the Caucasus became the source of an important new Circum-Pontic Metallurgical Province (CPM). Skelya people of the steppe had expanded to the northern Caucasus, and this, together with influences coming from the northwards expanding *Uruk culture* of Mesopotamia via the south Caucasian *Kuro-Arakses culture,* led to the formation of the splendid *Majkop culture* that flourished in the Kuban River valley c. 3700–3100 BCE (cf. Chernykh 1992:

54–124; Anthony 2007: 282–299). The Majkop culture including its late Novosvobodnaya-Klady phase exerted great influence upon the Yamnaya culture of the Pontic-Caspian steppes, which were transformed into the extensive ***Catacomb Grave cultural complex*** (c. 2500–1950 BCE) (cf. Kaiser 2003; Chernykh 1992: 124–132; for the dating cf. Parzinger 2006: 350), which apparently formed the basis of the "Iranian" branch of Indo-Iranian. "Iranian" and "Indo-Aryan", of course, are anachronistic labels when applied to the predecessors of these language groups spoken in Eurasian steppes and forest-steppes. The terms simply reflect the fact that languages belonging of these two chief branches of Aryan languages are nowadays spoken mainly in Iran and India respectively.

"Indo-Aryan" subbranch

A dialectal differentiation eventually resulting in the formation the two subbranches of Indo-Iranian seems to have started around 2500 BCE. The "Indo-Aryan" branch seems to have its origin in the ***Late Yamnaya culture*** of the Upper Don and the ***Late Yamnaya / Poltavka culture*** of the Volga-Urals, which are synchronous with Early Catacomb Graves, c. 2500–2100 BCE (cf. Chernykh 1992: 132–133; Parzinger 2006: 241). The ***Abashevo culture*** (c. 2200–1850 BCE) (Figure 5), which extended along the border of the forest steppe and the forest zone from the Upper Don to the Upper Tobol river, had its origin in these eastern Late Yamnaya cultures. Its eastward expansion was motivated by the sandstone deposits with pure copper, for which the Abashevo people on the Lower Kama and Belaya rivers fought with the Balanovo people. While the Abashevo burials with their kurgans are similar to those of the Poltavka culture, the early Abashevo ceramics resemble the Fat'yanovo-Balanovo Corded Ware, which had been in these parts earlier along with the *Volosovo* and *Garino-Bor cultures,* candidates to archaeological correlates for Late Proto-Uralic. (On the Abashevo culture, cf. Pryakhin & Khalikov 1987; Chernykh 1992: 194–204; Carpelan & Parpola 2001: 93–95; Parzinger 2006: 354; Anthony 2007: 382–385; Koryakova & Epimakhov 2007: 57–66.) The ***Sejma-Turbino transcultural phenomenon*** (c. 2100/1900–1600 BCE), which seems to have its origin in the Abashevo culture, will be discussed below in connection with the Uralic languages.

Around the 22nd century BCE, part of the Abashevo people moved southwards to take possession of the rich metal ores and pastures until then occupied by the Poltavka culture. This resulted in the emergence of the ***Potapovka culture*** of the Mid-Volga (c. 2100–1700) and of the powerful ***Sintashta culture*** (c. 2100–1700 BCE) in the southeast Urals engaged in metallurgy and stock-breeding. The Sintashta culture developed the horse-drawn chariot, which is first known from its elite graves. (Cf. Gening & al. 1992; Parzinger 2006: 246–262; Anthony 2007: 385–411; Koryakova & Epimakhov 2007: 66–81.) The "daughter branch" of Sintashta, the ***Petrovka culture*** (c. 2000–1700 BCE), expanded eastwards into the Tobol-Ishim interfluve of northern Kazakhstan (cf. Parzinger 2006: 318–323). This "Novyj Kumak horizon" (= Sintashta & Petrovka) gave rise to the extensive ***Andronovo cultural community*** (a basic monograph on the

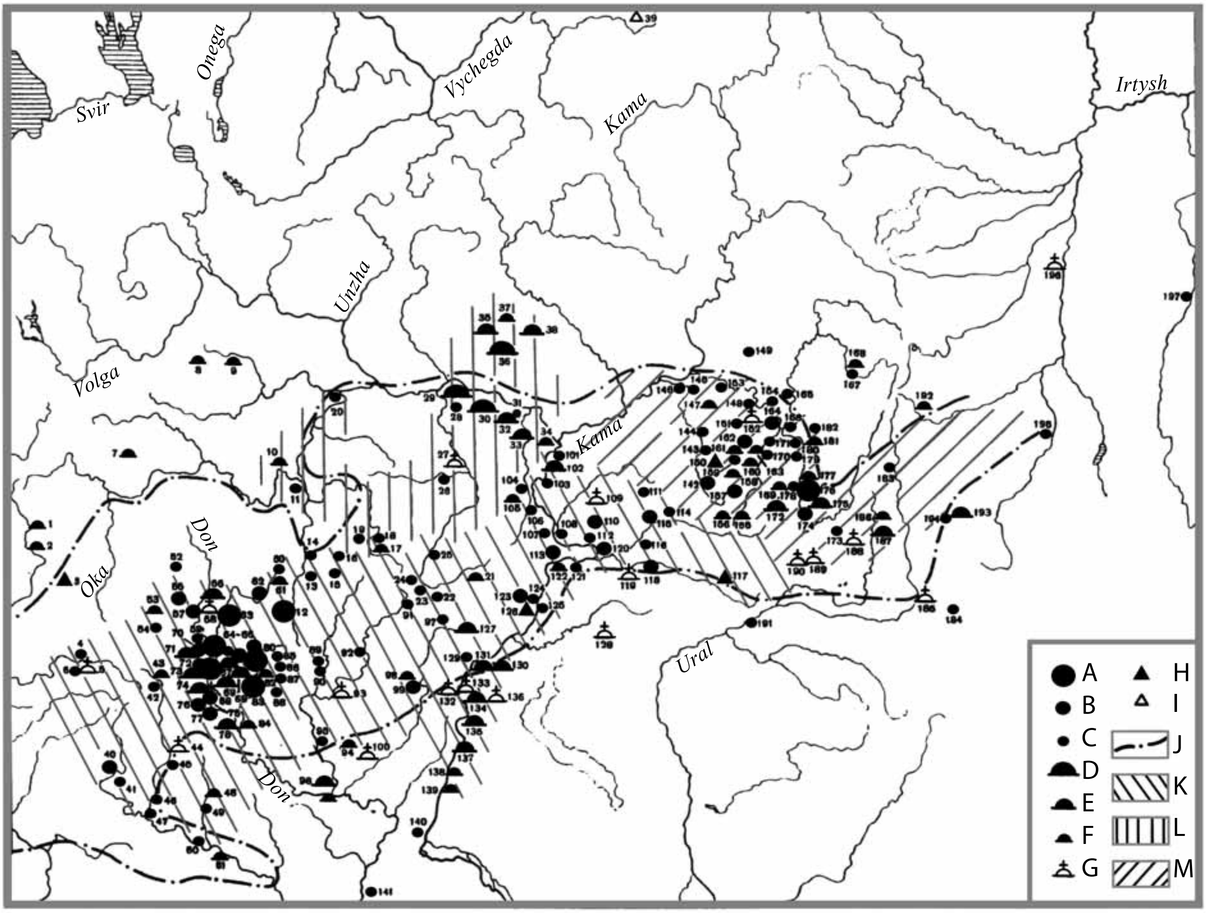

Figure 5. Sites and area of the Abashevo cultural-historical community. Explanation of the symbols: (A) a cluster of 6 to 10 habitation sites with Abashevo ceramics; (B) a cluster of 2 to 5 Abashevo sites; (C) a single Abashevo site; (D) a cluster of 6 to 10 cemeteries with kurgan burials; (E) a cluster of 2 to 5 cemeteries with kurgan burials; (F) a single cemetery with kurgan burials; (G) isolated kurgan burials and cemeteries with a few kurgans or burials of the Abashevo type; (H) cemetery without kurgan burials; with separate Abashevo barrows or burials; (I) an isolated non-kurgan burial; (J) the present border of the forest-steppe; (K) area of the Don-Volga variant of the Abashevo culture; (L) area of the Mid-Volga variant of the Abashevo culture; (M) area of the Urals variant of the Abashevo culture. (After Carpelan & Parpola 2001: 94 fig 18, copied from Pryakhin & Khalikov 1987: 126–127, map 23, where names of the 197 numbered sites are given).

Andronovo cultures is Kuz'mina 2007). The Andronovo community is divided into two main branches: the earlier ***Alakul' Andronovo*** (c. 2000–1700) mainly in the whole steppe and forest-steppe of the Trans-Urals and northern, western and central Kazakhstan and Chorasmia (cf. Parzinger 2006: 257–261; 323–325; 329; Koryakova & Epimakhov 2007: 126–138; 146–150; Tkachev 2007 considers Petrovka to be the early phase of Alakul' Andronovo), and the ***Fëdorovo Andronovo*** (c. 1850–1450 BCE) that covered practically the whole of Turkmenistan and Kazakhstan; in the north, it is connected especially with the forest steppe, from the Trans-Urals in the west to eastern Kazakhstan and the Upper Yenissei (cf. Koryakova & Epimakhov 2007: 138–151). The symbiosis of Fëdorovo Andronovans with the probably Proto-East-Uralic speaking people the *Cherkaskul' culture* (cf. Figure 10) will be discussed below.

In the oases of southern Turkmenistan, Andronovo campsites (cf. Gubaev & al. eds. 1998; Salvatori & Tosi eds. 2008) surround the fortified settlements of the semi-urban, agriculturally based ***Bactria and Margiana Archaeological Complex (BMAC),*** also called ***the Oxus Civilization*** (c. 2200–1450 BCE) (cf. Sarianidi 2002; 2007; Sarianidi & al. 2008; Anthony 2007: 421–435; Parzinger 2006: 432; Francfort 2005). The BMAC culture had a local and Near Eastern origin, but its rule seems to have been taken over early on by Proto-Indo-Aryan speaking steppe pastoralists. A BMAC elite grave at Zardcha Khalifa on the Zeravshan River in Tajikistan had a horse-drawn chariot with Sintashta-type bits and bone cheek-pieces, but typically BMAC ceramics (cf. Bobomulloev 1997).

The BMAC culture expanded to the Gorgan area of northern Iran, where a horse-drawn chariot is depicted on a cylinder seal from Tepe Hissar. In the wake of the tin trade between the BMAC and Anatolia, the horse-drawn chariot came to the Near East in the 20th century BCE. In 1500–1300 BCE, the powerful ***Mitanni kingdom*** of Syria was ruled by nobles with Proto-Indo-Aryan names associated with horses and chariot warfare (cf. Mayrhofer 1974: 11–34 and Parpola 2002: 74–78).

The BMAC expansions to the borderlands of South Asia include the ***Gandhara Grave culture*** (c. 1600–900 BCE) around the Swat Valley, the first local culture to have the domesticated horse (cf. Parpola 2005b). The horse and chariot have an important place in the Rigvedic hymns, which constitute the oldest literary monument of the Indo-Aryan languages, composed c. 1200–1000 BCE in the northern Indus Valley. (More on the pre- and early history of Indo-Aryan, see Parpola 2012b.)

"Iranian" (or "Irano-Aryan") subbranch

The "Iranian" branch apparently had its origin in the above mentioned ***Catacomb Grave culture*** (c. 2500–1950 BCE), which west of the Don was transformed into the ***culture with multi-roller ceramics (kul'tura mnogovalikovoj keramiki* = KMK**), also called the ***Babino III culture*** (c. 2100–1850 BCE) (Cf. Parzinger 2006: 352; Anthony 2007: 437). The ***Srubnaya alias Timber Grave culture*** (c. 1850–1450 BCE) succeeded not only the KMK culture but also the Abashevo culture over its entire area, and expanded also to the southern Urals where it coexisted with the contemporary Andronovo culture. (Cf. Chernykh 1992: 204–210; Parzinger 2006: 439; Anthony 2007: 435–441). The ***Pozdnyakovo culture*** (c. 1850–1450 BCE) of the Volga-Oka interfluve represents a Srubnaya expansion into the forest zone of central Russia (cf. Bader & Popova 1987).

In the Late Bronze Age (1450–800 BCE), the Srubnaya culture was followed by ***cultures distinguished by pottery with roller application (valikovaya keramika)*** (Figure 4). In the North Pontic steppes, the former KMK area, these comprised the ***Sabatinovka*** and ***Belozerka cultures*** (Figure 4 no. 5), in the Upper Don and the Lower and Mid-Volga the ***Late Srubnaya culture*** (Figure

4 no. 6). Roller ceramic cultures enlarged the earlier Srubnaya area westwards, northwards (to the Kama River basin) and eastwards. In the east, the roller pottery cultures came to cover the whole of Kazakhstan and Turkmenistan (previously occupied by the Andronovo cultures). In the steppe and forest steppe of northern Kazakhstan between the Tobol and Ishim rivers the roller pottery tradition is represented by the ***Alekseevka*** alias ***Sargary culture*** (c. 1500–900 BCE) (Figure 4 no. 8) (cf. Parzinger 2006: 444–448, 486–489; Koryakova & Epimakhov 2007: 162–170).

In southern Central Asia, the *valikovaya* tradition comprizes the ***Yaz I -related cultures*** (c. 1450–1000 BCE) (Figure 4 no. 12), which replaced the *BMAC,* but continued many of its traditions, among them fortifications, as evidenced at Tillya Tepe. It is Yaz I forts that seem to be meant in the Rigvedic references to the forts of the inimical Dāsas and Dasyus encountered by the Indo-Aryan speakers in the Indo-Iranian borderlands. The tribal name Daha in Old Persian and Greek sources refers to Saka tribes of southern Central Asia, and appear to go back to the word *daha* < **dasa* ’man’ in the Saka languages. No burials have been found in southern Central Asia between c. 1500 and 500 BCE; this has suggested that the Yaz I -related cultures there had adopted the custom of exposing their dead to vultures and other carrion animals, a practice current in Zoroastrianism, whose first texts, preserved in the Avesta — the oldest in any Iranian language — are supposed to have been composed in these very parts around the end of the second millennium BCE. That the Avestan language more or less represents ”Old Saka” is suggested also by the fact that the Saka words for ’god’ derive from *yazata,* the principal Avestan word for ‘god’, while the other Iranian languages mostly employ words related to Old Persian *baga*. The power and rapid spread of the roller pottery cultures and the Proto-Iranian language from the steppes of southeastern Europe in the Late Bronze Age is best explained by their large-scale adoption of horse riding. Riding now replaced chariotry in warfare, and in the Asiatic steppes, in southern Central Asia and in Iran this meant that Proto-Iranian replaced Proto-Indo-Aryan. From the site of Pirak in Pakistani Baluchistan come terracotta figurines of horse riders, dated to around 1500 BCE; these riders are anthropomorphic but their heads have bird’s beaks. It seems significant that many pointed felt caps of mounted Saka warriors from frozen tombs of the Altai mountains, dated to c. 500–200 BCE, have at top the shape of a bird’s head. (Cf. Parpola 2012b.)

In the Early Iron Age (c. 850–650 BCE), the roller pottery cultures of the Eurasian steppes were succeeded by the early phases of the Iranian-speaking ***Scythian, Sarmatian and Saka cultures*** based on mounted nomadism (cf. Parzinger 2006: 540–709).

Conclusion

Through unbroken chains of successive cultures having the same ultimate origin (the Copper Age cultures of the Pontic-Caspian steppes), the foregoing correlations have taken all the major branches of the Indo-European language family to the areas where they are first historically attested.

3. Formation of the Uralic (Finno-Ugric) language family

In accordance with his recent analyses of the phonological and lexical data, which have the approval of such leading experts as Juha Janhunen (personal communication, 2012), Jaakko Häkkinen (2009: 15–16) has suggested that Proto-Uralic was early on split into three dialectal groups: West-Uralic (later split into Saami, Finnic and Mordvin), Central Uralic (later split into Mari and Permic, or both separate from the beginning) and East Uralic (later split into Samoyed, Hungarian, Mansi, and Khanty). The western and central group may have remained united for some time after the separation of the eastern group, since several innovations can be singled out. This linguistic subgrouping is taken as the basis of the archaeological correlations I am suggesting in this paper.

On the basis of Proto-Uralic vocabulary, the present distribution of the Uralic languages, and what is known of the history of the peoples speaking Uralic languages, the original Uralic homeland has traditionally mostly been assumed to have consisted of a larger or smaller area in the forested northeastern part of European Russia. The vocabulary suggests a Mesolithic/sub-Neolithic hunter-gatherer economy, with no indication of agriculture or animal husbandry (cf. Kaisa Häkkinen 2001; Janhunen 2009: 66). The history of Uralic homeland research until the mid-1990s, with a fairly detailed description of the various views and their arguments, has been summarized in Finnish by Kaisa Häkkinen (1996) and in English by Vladimir Napol'skikh (1995), the latter recording well also the views of Soviet/Russian archaeologists. I return to some of these earlier hypotheses later on.

The archaeological correlation of Uralic languages that Christian Carpelan and I presented in 2001 took as its basis the so-called "continuity hypothesis", which had a breakthrough at the symposium on "the Prehistoric roots of the Finnish people" at Tvärminne in January 1980 (with its proceedings published in 1984 in Finnish with the title *Suomen väestön esihistorialliset juuret*), and which has since then been widely accepted in Finland by both archaeologists and historical linguists (cf., e.g., Kaisa Häkkinen 1996 and Lehtinen 2007). I shall first present (A) our 2001 scenario and its background (putting the correlated archaeological cultures into bold face only in the introductory chapter on the vanished Mesolithic languages, as the other correlations will be revised); then (B) criticism of the "continuity hypothesis" raised on linguistic grounds, followed by my own early attempt at an adjustment of the earlier model, and finally (C) my current correlations, largely based on the recent views of Petri Kallio (2006) and Jaakko Häkkinen (2009). As the criticism and the preliminary adjustments concern just Proto- and West-Uralic, parts (A) and (B) are limited to their correlations.

A. Correlations of Proto- and West Uralic based on the hypothesis of an unbroken cultural and linguistic continuity in Finland

Vanished Palaeo-European languages of northern Europe

During the Last Glacial Maximum c. 22000 BCE, the Palaeolithic population of Europe was forced to move to two separate refugia, one in the south-west and one in the south-east (Carpelan 2001: 38). The following successive Late Paleolithic cultures came into being as people following the edge of the receding ice cover moved from southwestern Europe northwards: ***Magdalenian*** (c. 19000–11000 BCE in France), ***Hamburg*** (since c. 13000 BCE from England to East Prussia), and ***Ahrensburg*** (since c. 11000 from the Netherlands to the Ukraine and Lithuania). The Late Palaeolithic ***Swidry*** culture (since c. 10500 BCE from eastern Poland to the southern Baltic and central Russia as far as the Volga-Oka) may have originated from Moldavia, the western end of the eastern refugium, but others derive it from the Hamburg-based Bromme culture. (Cf. Carpelan 2001: 38–40; Kriiska & Tvauri 2007: 14–16).

The Early Mesolithic ***Komsa culture*** (c. 10000–6000 BCE) of northernmost Norway represents the pioneering hunter-fishers who, starting from the then dry North Sea area colonized the Norwegian coasts first freed of ice when the Ice Age was coming to its end. The Early Mesolithic ***Suomusjärvi culture*** of Finland, probably at least partly based on the Kunda culture of eastern Baltic, reached northern Lapland by c. 7300 (cf. Carpelan 2001: 41–42; Kriiska & Tvauri 2007: 35.) The descendants of these pioneers remained culturally isolated in Lapland and preserved their genes and therefore probably also their ancient unknown language(s) until they were assimilated, not without detectable traces of the substratum, by the expanding Proto-Saami language (see below).

The Early Mesolithic ***Kunda culture*** (c. 9000–5000 BCE) of the eastern Baltic was directly continued in the sub-Neolithic ***Narva culture*** (c. 5500–3600 BCE) (cf. Kriiska & Tvauri 2007: 17–54). It was mainly based on the Ahrensburg culture and strongly influenced by the Early Mesolithic ***Maglemose culture*** of northwestern Europe, and considered by Carpelan (2006: 84) the northeastern margin of the western block of Late Palaeolithic and Early Mesolithic cultures.

These Late Palaeolithic and Early Mesolithic populations spoke unknown lost languages generally labeled “Palaeo-European”. Some archaeologists including Milton Nuñez (1987) and Pavel M. Dolukhanov (1989) have suggested that the languages of these populations could already have been Proto-Uralic, and that the Uralic homeland extended from the Baltic to the Urals. As the early foragers covered vast territories, also some linguists have supported such views. Lars-Gunnar Larsson (1990) has compared the distribution of the Uralic languages to that of the Cree Indians of Canada; yet Mallory (2001: 348–351) has pointed out that the vast distributions of major Subarctic language families of North America have a shallow time depth, which implies that some or many earlier languages once spoken in the areas involved have all become extinct through language shift. Kalevi Wiik (2001, 2003), basing himself partly on genetics, has even claimed that Proto-Uralic, hailing from the Ukraine refugium, extended to northwestern Europe in Mesolithic times; in support for this, Wiik (1997, 1998) has argued that Proto-Germanic has evidence of Finno-Ugric substratum influence, all of which has been shown to be totally unfounded (Kallio et al. 1997, 1998).

There is however wide agreement among linguists that protolanguages older than some 6000 years cannot be reached, and to reach even such depths is possible only in quite special circumstances, such as the case of the Indo-European language family which is documented exceptionally early and in exceptionally many branches. The Afroasiatic alias Semito-Hamitic protolanguage represents the ultimate limit with its age of perhaps 8000 years, with the very exceptional case of both of its main branches known from languages (Akkadian and ancient Egyptian) well attested 4500 years ago.

Christian Carpelan admits that "the languages spoken by Mesolithic societies cannot be reconstructed", but continues:

> "In spite of this, I have ventured to suggest that the successful spread of Postsviderian archaeological elements over the greater part of northern East Europe may have accompanied a corresponding spread of a language used as a *lingua franca*. Furthermore this language would have included elements on which a reconstructable *Proto-Uralic* later was developed in the Central Zone, or more precisely, the Volga-Oka region. In the Western Zone, i.e. the East Baltic region, the Kunda culture may again have represented the northeastern margin of an *Ancient European* block of languages due to a strong dependence on Ahrensburg and Duvensee/Maglemose. The origin of the Early Mesolithic population of the Kama-Ural region (Eastern Zone) is found in the south or southeast, without any connections to the populations of the two other populations. For this reason, I suggest that this zonal division had a lingual, hence ethnic, significance" (Carpelan 2006: 84).

Proto-Uralic, Proto-Finno-Ugric and their predecessors

Many leading Uralists have estimated the disintegration of Proto-Uralic to have taken place around 4000 BCE (cf. Kallio 2006: 2, table 1): 4000 BCE is the estimate of Kettunen & Vaula (1938), Décsy (1965), Hajdú (1975), Korhonen (1981) and Taagepera (1994); Toivonen (1953) with 3500 BCE is an exception (and based on a considerably different state-of-art in the research of prehistory and the history of the Uralic languages). Janhunen previously considered even 6000 BCE a possible date for the diffusion of Proto-Uralic (2001: 214), but now puts it around 3000 BCE (2007: 224; 2009: 68). Finland and Russian Karelia have received four major waves of archaeological influence within this time span (cf. Carpelan & Parpola 2001: 79–89; Carpelan 2002a, 2002b, 2006, and pers. comm. 2011):

(1) The *Sperrings type of Combed Ware* (c. 5300–4500 BCE) in Finland and Russian Karelia, the very first ceramics in these parts, has as its origin the *Upper Volga Ware* (c. 5900–5000 BCE) in the Upper Volga region.

(2) The *Comb-Pitted Ware (= Typical / Style2 Combed Ware)* (c. 3900–3500 BCE) in Finland, Russian Karelia and East Baltic (Estonia and Latvia, cf. Kriiska & Tvauri 2007: 55) has its origin in the Pitted Ware of the *Lyalovo culture* (c. 5000–3650 BCE) in the Upper Volga region.

(3) The subsequent *Kierikki Ware* (c. 3600–3100) and *Pöljä/Jysmä Ware* (c. 3100–1000 BCE) variants of the *Asbestos Ware* (Comb Ceramics with crushed asbestos mixed in its clay) in Finland and Russian Karelia received some influence from the *Volosovo culture* (c. 3650–1900 BCE) in the Upper Volga region.

(4) The *Netted Ware (= Textile Ceramics, Fabric Impressed Ware)* (from c. 1800 to 200 BCE or even 600 CE) in Finland, Russian Karelia and the west Russian region east of the Narva River (cf. Lavento 2001: 106–107). Its origin is in the *Netted Ware (Setchataya keramika)* alias *Textile Ceramics* (c. 1900–500 BCE) of the Upper Volga region.

All the above-enumerated four waves of influence, which came to Russian Karelia and Finland between 5300 and 1700 BCE, had their origin in one and the same area, the Upper Volga region, the interfluve between the Volga and Oka rivers. The cultures of the *Upper Volga Ware* (c. 5900–5000 BCE), *Lyalovo* with its *Pitted Ware* (c. 5000–3650 BCE) and *Volosovo* (c. 3650–1900 BCE) represent successive stages of the cultural development of basically one and the same sub-Neolithic hunter-fisher population. Continuity in the flint technology indicates that the cultural developments were not brought about by the arrival of an alien male population from somewhere else to the core area in the Volga-Oka interfluve. How the pottery production — considered to be the domain of women — spread to these parts remains unclear (cf. Carpelan 2006: 84–85).

The successive waves of influence from this area, which constantly produced a population surplus, would then have brought to Karelia and Finland successive stages of one and the same language, i.e. several early preforms of Proto-Uralic. Substrata consisting of archaic linguistic relatives might explain on the one hand why Proto-Finnic (=Proto-Saami-Finnic) did not change much after moving from the Uralic homeland to Karelia and Finland, remaining especially in phonology very close to Proto-Uralic (cf. Lehtinen 2007: 94). On the other hand such a linguistic relationship would have made communication possible and eased the integration of the newcomers and the earlier local population.

The Comb-Pitted Ware complex expanded from the Volga-Oka interfluve not only north and west to Finland, Karelia, Estonia and Latvia, but also eastwards bringing Volga-Oka elements as far as the Vyatka and the Lower Kama, and creating a contact network that among other things brought objects of Cembra pine and copper from the Urals to Finland (cf. Carpelan & Parpola 2001: 82–83; Carpelan 2006: 85). Dating the disintegration of Proto-Uralic around 4000 BCE closely agrees with the arrival of Comb-Pitted Ware to Russian Karelia, Finland, and northern East Baltic, the core speaking areas of Proto-Saami and the Baltic Finnic languages. Proto-Uralic was accordingly correlated with the Lyalovo culture and the next stage of development, Proto-Finno-Ugric, with the Volosovo culture. The latter would have split into the Finno-Permic and Ugric branches after the Volosovo culture, along with the Abashevo culture, expanded eastwards into the Kama-Urals area, imposing the Finno-Ugric language upon the local Garino-Bor culture (cf. Carpelan & Parpola 2001: 95).

Indo-European contacts reflected in the loanwords of Proto-Uralic, Proto-Finno-Ugric and Proto-Saami-Finnic

The influence of the Lyalovo culture extended in the south to the forest steppe between the Dnieper and the Don, to the neighbourhood of the Chalcolithic *Srednij Stog culture* (c. 4500–3500 BCE) correlated above with Early Proto-Indo-European.

Around 2800–2600 BCE, people of the *Corded Ware* or *Battle Axe culture,* correlated above with Northwest Indo-European, coming from the south and west penetrated the whole area occupied by the Volosovo culture, forming the *Fat'yanovo culture* and living in symbiosis with the Volosovo people until about 1900 BCE. From about 2200 the eastern extension of Fat'yanovo, the *Balanovo* culture, flourished between the mouths of the Oka and Kama. These immigrant cultures were eventually assimilated to the Volosovo culture, forming the culture of *Netted Ware* alias *Textile Ceramic* around 1900 BCE. The close and long-continued contact would have influenced the surviving Proto-Finno-Ugric and given it a number of early Indo-European loanwords of Pre-Proto-Balto-Slavic variety.

About 2200 BCE the *Abashevo culture*, correlated above with early Proto-Indo-Aryan, spread from the Don and Volga steppes to the southern half of the Volosovo area along the forest/forest steppe border. Like the eastern Balanovo extension of the Fat'yanovo culture, the Abashevo culture too fought for the possession of the Kama-Vyatka area rich of copper. Around 1850 BCE, the Abashevo culture was for a short period replaced by the *Early Srubnaya culture*, correlated with early Proto-Iranian, whose *Pozdnyakovo* branch (c. 1800–1500 BCE) in the Volga-Oka interfluve exerted strong influence on the Netted Ware culture soon after its formation.

The *Corded Ware (*or *Battle Axe) culture* intruded into the Eastern Baltic and coastal Finland already around 3100 BCE. The continuity hypothesis maintains that the early Proto-Finnic speakers of the coastal regions, who had come to Finland in the 4th millennium BCE with the Comb-Pitted Ware, coexisted with the Corded Ware newcomers, gradually adopting their pastoral culture and with it a number of NW-IE loanwords, but assimilating the immigrants linguistically. The fusion of the Corded Ware and the local Comb-Pitted Ware culture resulted into the formation of the *Kiukais culture* (c. 2300–1500) of southwestern Finland, which around 2300 received some cultural impulses from Estonia, manifested in the appearance of the *Western Textile Ceramic* (which is different from the more easterly *Textile Ceramic* or *Netted Ware*, and which is first attested in Estonia c. 2700 BCE, cf. Kriiska & Tvauri 2007: 88), and supposed to have been accompanied by an influx of loanwords coming from Proto-Baltic. At the same time, the Kiukais culture is supposed to have spread the custom of burying chiefs in stone cairns to Estonia.

The coming of the Corded Ware people and their assimilation created a cultural and supposedly also a linguistic split in Finland, which the continuity hypothesis has interpreted to mean dividing Proto-Saami-Finnic unity into its two branches. Baltic Finnic, or simply Finnic, would have emerged in the coastal regions of Finland and in the northern East Baltic, while preforms of Saami would have been spoken in the inland parts of Finland.

The *Nordic Bronze Age culture*, correlated above with early Proto-Germanic, exerted a strong influence upon coastal Finland and Estonia 1600–700 BCE. Due to this, the Kiukais culture was transformed into the culture of *Paimio ceramics* (c. 1600–700 BCE), later continued by *Morby ceramics* (c. 700 BCE – 200 CE). The assumption is that clear cultural continuity was accompanied by linguistic continuity. Having assimilated the language of the Germanic traders and relatively few settlers of the Bronze Age, the language of coastal Finland is assumed to have reached the stage of Proto-Finnish at the beginning of the Christian era. In Estonia, the Paimio ceramics have a close counterpart in the contemporaneous *Asva ceramics.*

If preforms of Saami were spoken in the whole of Finland and Karelia since the fourth millennium, Proto-Saami supposedly emerged from the merger of the original Combed Ware population and the superstratum of the Netted Ware newcomers, supposed to have brought a number of Proto-Baltic and Proto-Aryan loanwords (cf. Carpelan & Parpola 2001: 88–89). The *Netted Ware,* which formed around 1900 BCE in the Volga-Oka region, spread soon with some population movement to the eastern border of Estonia (Narva), to most of Finland (as far north as the Oulu river) excepting the coastal regions and to Russian Karelia. It brought about considerable cultural change, including modest swidden cultivation and bronze metallurgy. The Netted Ware of Finland and Karelia (on which see Lavento 2001) is divided into the older *Sarsa-Tomitsa ceramics* (with its later subgroup *Kalmistonmäki ceramics*) (c. 1700–500 BCE), and the subsequent cultures with asbestos-mixed ceramics such as *Luukonsaari* (c. 700/500 BCE to 200 BCE). In Lapland the descendants of the Mesolithic pioneers of the Komsa and Suomusjärvi cultures probably preserved their Palaeo-European language until it was assimilated by expanding Saami. This would have started happening already with the spread of the *Lovozero Ware* (c. 1900–1000 BCE) to Lapland (cf. Carpelan & Parpola 2001: 78) and brought to conclusion with the spread of the *Kjelmøy Ware* there at the beginning of the Iron Age, c. 650 BCE (cf. Carpelan 2003: 86–87).

B. Criticism of the “continuity hypothesis” and an attempt at an adjustment

The history of the “continuity hypothesis” was outlined and its assumptions were sharply criticized by Ante and Aslak Aikio in 2001; and Jaakko Häkkinen (2010) has subsequently discussed at length the methodological untenability of the hypothesis. Among other things, the Aikios found the relationship between Finnish and Estonian too close for them to have been separated from each other by sea for some 5000 years. This view has been strongly expressed also by Juha Janhunen in our personal conversations over the years, and I have become convinced that it is correct. As noted by the Aikios, the counter argument that the narrow Bay of Finland (which often freezes in winter) rather connects than separates the peoples living on its shores may be valid for shorter periods but hardly for many thousands of years. The Aikios further saw no compelling reason why the early Indo-European loanwords should have been borrowed in Finland instead of for example Estonia.

The Aikios thus claimed a much lower chronology for Proto-Finnic than was assumed in the “continuity hypothesis”. This has been supported also by Janne Saarikivi and Riho Grünthal (2005), while Jorma Koivulehto (2006) — author of numerous fine NW-IE, Proto-Aryan, Proto-Baltic, and Proto-Germanic etymologies of West Uralic words (cf. e.g. Koivulehto 1999a; 1999b; 2000; 2001) — found no essential reason to change his support to the “continuity hypothesis”. Petri Kallio already in 1998 criticized the early dating of Proto-Baltic implied by the continuity hypothesis in the alleged borrowings into Proto-Finnic spoken in the Kiukais culture. Kallio (2006, 2007) and Jaakko Häkkinen (2009) not only subscribed to the lower chronology of Proto-Finnic but extended it to Proto-Uralic, pointing out that the disintegration of Proto-Uralic is a relatively late phenomenon: the Uralic protolanguage already certainly had several Indo-Iranian loanwords that reflect both an earlier and a later phase of development.

In response to this justified criticism my first revision was to correlate Proto-Uralic with the *Volosovo culture* (c. 3650–1900 BCE), as its late disintegration would allow the presence of Indo-Iranian loanwords in Proto-Uralic. In that case the *Netted Ware,* which c. 1900 BCE succeeded the Volosovo culture in the Volga-Oka region, would be the only possible archaeological correlate for Proto-Finno-Saamic, or rather for Proto-Finno-Volgaic. By 1700 BCE the Netted Ware culture spread in the west up to the Narva river, but not to Estonia, in the north to most of Finland (as far north as the Oulu river) excepting the coastal regions, to Russian Karelia, and later, around 1000 BCE also to the Mid-Volga area.

This changed scenario fits other members of West Uralic, but the origin of (Baltic) Finnic turned out to be a knotty problem. At the outset it should be noted that the earlier assumed Finno-Saamic protolanguage is no more widely supported (cf. Itkonen 1997; Koivulehto 1999c; Saarikivi & Grünthal 2005; Grünthal 2007). In the opinion of Juha Janhunen, “the mutual ordering of the three westernmost branches, Finnic, Saamic, and Mordvinic, is open to alternative interpretations”; he himself is ready to consider (Baltic) Finnic closer to Mordvinic than to Saamic (cf. Janhunen 2009: 65). If the Finnic and Saami branches did not become differentiated in Finland, as the "continuity hypothesis" has maintained, the Finnic homeland should have been somewhere between the Saami area, presumably the Netted Ware area covering most of Finland and Russian Karelia, and the homeland of Mordvin and those related Volga-Finnic languages that have disappeared as a result of the Russian expansion.

Proto-Mordvin and the later slavicized Muroma can be correlated with the *Gorodets culture* (800 BCE-800 CE), which continued the Netted Ware traditions (cf. Gusakov & Kuz'minykh 2007) in more or less the areas where Mordvin has been spoken, in the Mid-Volga region from the mouth of the Oka southeast down to Saratov. The Gorodets culture has influenced also the Mari speakers of the Mid-Volga area (cf. Fodor 1975: 68–69; Kuz'minykh 2006: 82–84).

Place name studies have indicated that the whole of Finland and Karelia including the southwestern coast were inhabited by Saami speakers in the Early Iron Age, before the spread of Finnish speakers. This is supported also by the numerous Saami loanwords in Finnish and Karelian. (Cf. Salo 1997: 22–25; Salo 2000; 2004; Aikio & Aikio 2001; Ante Aikio 2003; 2009; Saarikivi 2006; 2008.) On the other hand, there is agreement that the Finnish-speaking population was very small and limited to southwestern Finland at the beginning of the Christian era, and that it grew rather slowly, and only gradually moved further inland to Tavastia and eastwards reaching the Karelian Isthmus by 700 CE, and started spreading more widely only from the twelfth century onwards (cf. Itkonen 1984; Kivikoski 1961: 145–293; Salo 2000; 2004; Jutikkala & Pirinen 2002: 13; Aikio 2009: 7).

As the Finnic language Estonian, spoken in Estonia, is so closely related to Finnish that according to Juha Janhunen (personal communication) these two languages cannot have become separated earlier than about 2000 years ago, there is every reason to reconsider the traditional "immigration theory" that prevailed for a long time before the "continuity theory". It was created by the Danish linguist Vilhelm Thomsen (1890) and the archaeologist Alfred Hackman (1905). The Finnic homeland had to be relatively confined, and it was situated south of the Bay of Finland, somewhat to the east. The coming of Finnish speakers to Finland was correlated with what is still accepted by archaeologists as evidence for some amount of immigration from Estonia: the appearance of *tarand-* or yard-type cemeteries (Finnish *tarhakalmisto*) on the south and southwestern coast of Finland during the Early Roman Iron Age in the first centuries CE. These cemeteries have counterparts in the 'typical *tarand* cemeteries' of Estonia and Latvia. There are also new types of iron weapons and ornaments of Estonian and Baltic origin. (Cf. Hackman 1905; Kivikoski 1961: 104–144; Salo 1968; 1984: 185–247; Huurre 2004: 125–127.)

The problem with placing the Finnic homeland in Estonia is that the Netted Ware did not come to Estonia, but spread only as far west as the Narva river. It is true that archaeological distribution maps published by Russian scholars include Estonia in the area of Netted Ware, but this is incorrect, since distinction must be made between the Netted Ware or eastern Textile ceramics, and the western Textile ceramics in Estonia and in the Kiukais culture of southern Finland.

Between the Gorodets culture (correlated with Mordvinic) and Estonia and Latvia is the *D'yakovo culture* (c. 800 BCE to 600 CE) of the Upper Volga-Oka, which continues the Netted Ware (cf. Gusakov & Kuz'minykh 2008; on the D'yakovo culture, cf. Krasnov ed. 1974; Krenke 2011). It may have had as its language the ancestor(s) of the disappeared West Uralic languages, Merya and Meshchera, spoken in this area until medieval times. But nothing points to a D'yakovo immigration to Estonia and Latvia, while on the contrary, a strong wave of influence brought elements and people from Lithuania to the D'yakovo culture during its final period c. 200–600 CE. The Baltic toponyms of the Volga-Oka area probably date from this period, and suggest that the D'yakovo culture had a Baltic-speaking elite superstratum (cf. Carpelan 2006: 87; Kuz'minykh 2006: 82; Krenke 2011).

As much as seventy percent of the ceramics in southeastern Estonia and eastern Latvia is textile impressed (cf. Kriiska & Tvauri 2007: 145). The Late Textile ceramics of Estonia (c. 500 BCE – 500 CE) differ in many ways from the Estonian Textile ceramics of the Early Bronze Age (cf. Lang 2007: 135–137). This late type has a wide distribution in Estonia and Harri Moora and Silvia Laul have seen its origin in the eastern Netted Ware tradition (cf. Lavento 2001: 34–35). When I speculated on this basis that perhaps the Proto-Finnic homeland was in the still largely unexplored area between the D'yakovo culture and the eastern border of Estonia, especially the Daugava valley, where finds of D'yakovo-like net sinkers have been reported (cf. Smirnov 1974: 89), Carpelan observed that this is just wishful thinking without much likelihood, and should be frankly acknowledged as such. In any case the Late Textile ceramics of Estonia has nothing to do with the Estonia—Finland contacts at this time.

Petri Kallio in his search for the Finnic homeland had independently arrived at the same location as my own above-described preliminary solution, which was rejected by Carpelan. South Estonian has been supposed to be the first Finnic language to separate from the Proto-Finnic language community (cf. Sammallahti 1977; Viitso 2000; Kallio 2007). In his forthcoming paper "The language contact situation in Prehistoric Northeastern Europe", Kallio places this first dialectal split of Proto-Finnic ("Inland Finnic" > Chudic > South Estonian) in the Pskov-Novgorod region and connects it with the local *Long Barrow culture* (c. 400–1000 CE, cf. Tvauri 2006).

C. New archaeological model for the prehistory of the Uralic languages

West Uralic

I start my current correlations of the early Uralic languages and archaeology with West Uralic, because I want to present my new solution to the problem of Finnic origins immediately after the preceding discussion. First of all, I would like to confirm my conviction that West Uralic is to be connected with the ***Netted Ware culture***, which formed in the Upper Volga area around 1900 BCE as the result of the fusion of the Volosovo and Fat'yanovo cultures and with some influence of the Abashevo culture and soon afterwards with a strong influence of the (Early Proto-Iranian-correlated) *Pozdnyakovo* culture; by 1800 or 1700 BCE, the Netted Ware spread widely towards the north and northwest (Figure 6).

It was only around 1000 BCE that the Netted Ware expanded eastward into the Mid-Volga area between the mouths of the Oka and Vyatka (Figure 6c). The Mid-Volga had until then been occupied by the *Chirkovo culture* (c. 1800–700 BCE), the result of the fusion of the Volosovo culture with the Balanovo and Abashevo elites, which had vied with each other for the possession of the rich metal deposits of the area. Around the time the Netted Ware came there, the Mid-Volga area was under the strong influence of the powerful *Anan'ino culture* of the neighbouring Vyatka-Kama area, famed for its metallurgy. The end result was the formation of the ***Akozino* or *Akhmylovo culture*** (c. 800–300 BCE, on which cf. Patrushev 1989; 2000: 112–161). This culture is distinguished by three special characteristics: (1) Netted Ware ceramics, (2) socketed axes of "Akozino-Mälar" type, produced in a special metallurgical furnace different from that of the Anan'ino culture, and (3) funeral customs involving the inclusion of the Akozino-Mälar axes and other specific weapons among the grave goods (cf. Kuz'minykh & Chizhevskij 2008: 34). The Akozino people may have come to the Mid-Volga from the Mid-Oka, where the Mladshij Volosovo cemetery "is very close to the Akozino antiquities by its burial rite and grave goods" (Kuz'minykh 2006: 77). According to Christian Carpelan (personal

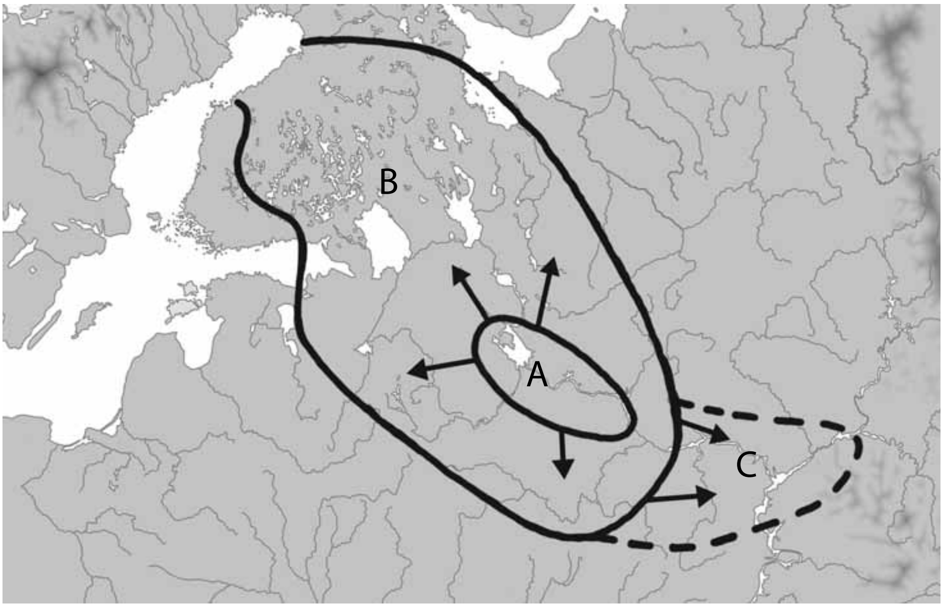

Figure 6. Distribution of the Netted Ware according to Christian Carpelan. A: Emergence of the Netted Ware on the Upper Volga c. 1900 calBC. B: Spread of Netted Ware by c. 1800 calBC. C: Early Iron Age spread of Netted Ware. After Carpelan 2002: 198; cf. Carpelan & Parpola 2001: 89, fig. 16.

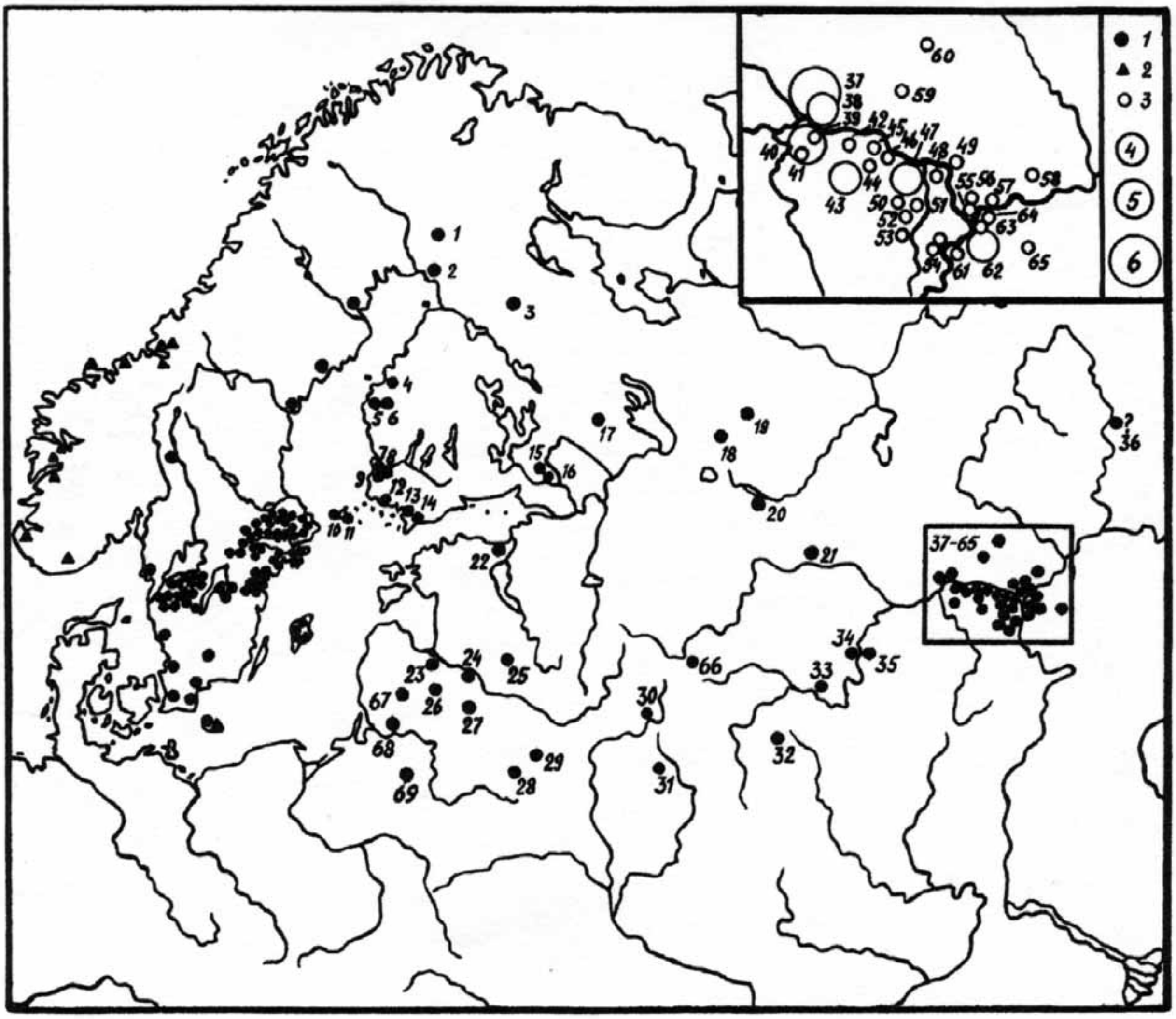

Abb. 2. Verbreitung der KAM in Nord- und Osteuropa

1 Kemi, 2 Rovaniemi, 3 Suomussalmi, 4 Jeppo, 5 Laihia, 6 Paimio, 7 Kiukainen, 8 Nakkila, 9 Harjavalta, 10 Saltvik, 11 Sund, 12 Kimito, 13 Västanfjärd, 14 Lojo, 15 Kaukola, 16 Valkjärvi, 17 Kudoma XI, 18 Kinema, 19 Palkino, 20 Veksa, 21 Vatažka, 22 Vaivara, 23 Klan'gukalns, 24 Ekabpils, 25 Lielais Ludzas, 26 Vaškaj (Konstantinovo), 27 Narkunaj, 28 Minsk, 29 Kurgan bei Borisov, 30 Nekvasino, 31 Žaryn', 32 Satinskoe, 33 Rjasanland, 34 Murom, 35 Mladšij Volosovskij, 36 Perm', OM, 37 Staršij Achmylovskij, 38 Koz'modem'janskij, 39 Malachaj, 40 Akozinskij, 41 Paratmary, 42 b. Tscheboksarskij u., 43 Ubeevskij, 44 Sjurbeevo, 45 Bol'še-Jangil'dinskoe, 46 Kriuši, 47 Al'menevo, 48 b. Svijažskij u., 49 Kazanka I, 50 Mendijarovo, 51 Kuvšinovo, 52 Bol'šie Bakyrči, 53 Nižnij Bijabaš, 54 b. Tetjušskij u., 55 Taškirmen', 56 Taneevskij, 57 Soroč'i Gory, 58 Bol'šie Nyrsi, 59 Burman, 60 Jurino, 61 Aga-Bazar, 62 Novo-Mordovskij I, 63 Izmeri, 64 Semenovskij VI, 65 Biljar, Sammlung A.F. Lichačev, 66 Lesničino, 67 Litauen, 68 Rambinas, 68 Tarlawka. Die Symbole bedeuten: 1 KAM, 2 die norwegische KAM-Form, 3 1–2 Funde, 4 3–25 Funde, 5 26–50 Funde, 6 mehr als 100 Funde.

Figure 7. Distribution of the Akozino-Mälar axes according to Sergej V. Kuz'minykh (1996: 8, Abb. 2).

communication), this cemetery contained an axe of the older *Lusatian (Lausitz) culture* of Poland, which he sees as the model for the distinctive Akozino-Mälar axes that are not based on any Anan'ino prototype.

I suggest that Proto-Finnic was introduced to the Baltic area by warrior-traders of the Akozino-Akhmylovo culture, who brought ***Akozino-Mälar axes*** to southern and southwestern Finland, the Åland islands and, in so great numbers that it must have involved the movement of a fair amount of people, to the Mälaren area of eastern Sweden around 800–500 BCE (Figure 7). This main route along which the Akozino-Mälar axes went westwards probably followed the same waterways as the Vikings later, but another trade route was through the Daugava valley mentioned earlier while speaking of South Estonian as the Finnic language that was the first to separate from the protolanguage. (On the Akozino-Mälar axes see especially Kuz'minykh 1996; cf. also Meinander 1985; Patrushev 2004; Lavento 2001: 122–123; Asplund 2008: 231. Note that still e.g. Cunliffe (2008: 263, fig. 8.24) continues to hold the outdated view that the axes have their origin in Sweden and were exported to the east.) On the basis of the associated archaeological evidence detailed below, I suggest that the "immigration of Finnic" was not from Estonia to SW Finland as has been thought, but in the opposite direction, taking the Proto-Finnic language to Estonia (Estonian) and then further to Courland (Livonian) and to Latvia (the Finnic superstratum whose assimilation to the local Baltic speakers led to the differentiation of Lithuanian and Latvian).

The Akozino-Mälar axes come to Finland at the very end (period VI) of the Late Bronze Age and the very beginning of Pre-Roman Iron Age, when the influence of the Nordic Bronze Age culture upon the coasts of Finland and Estonia has declined. At this time the *Paimio ceramics* of the Finnish coasts change into the ***Morby ceramics*** (c. 700 BCE – 200 CE). Significantly, Morby ceramics have very similar counterparts in the ***Ilmandu style ceramics*** of Estonia, also found at a few Latvian sites (cf. Asplund 2008: 225–228) as well as in the Mälaren area in Sweden (cf. Lang 2007: 130–132; Asplund 2008: 228–230). The earlier Paimio Ware (c. 1600–700 BCE) and the corresponding Asva Ware of Estonia continue side by side with the new Morby/Ilmandu pottery, and is found along with it also in the Mälaren area (cf. Lang 2007: 127–128). Technically the Morby Ware continues the Paimio Ware, but its ornamentation has been compared to that of the Early Iron Age ceramics of the Upper Volga (Salo 1984: 194; cf. Asplund 2008: 213, 216). Also other types of pottery are relevant, such as the typical Lüganuse style pottery of Estonia with counterparts that were common in southwestern Finland and in the eastern European forest belt (cf. Lang 2007: 130).

The ***tarand* graves** have figured prominently in the hypothesis of the immigration of Finnic speakers from Estonia around the beginning of the Christian era. Earlier only "typical *tarand* graves" of the Roman Iron Age were known, but now as many as twenty-six "early *tarand* graves" have been partially or fully excavated in Estonia, mostly in the coastal areas of northern and western Estonia and on the islands. They are dated to c. 800–400 BCE, and "similar graves occur in south-western Finland, the eastern part of central Sweden, and in northern Latvia and Courland" (Lang 2007: 170; the early *tarands* are described 170–191). There are many types of *tarand* graves, also among the early ones, but it is quite common that they form long rows of rectangular 'yards' or 'enclosures' (*tarand* in Estonian). Silvia Laul (1990) and Marika Mägi (2005) have suggested that they are stone foundations of "mortuary houses", corner-joined horizontal log cabins, in which ancestral bones were stored, such as characterize the burial customs of the Early Iron Age D'yakovo culture of the Upper Volga (cf. Smirnov 1990), persisting until 700 CE on the northern D'yakovo border near Vologda (cf. Bashen'kin 1996). "Houses of the Dead" were built in the Akozino-Akhmylovo culture on the Mid-Volga as well (cf. Khalikov 1977: 42–44; Patrushev 2000: 131–142), and Kuz'minykh (2006: 81), too, thinks they are source of the Finnish and Estonian *tarand* graves. The original and most common burial mode of the early *tarand* graves of Estonia was inhumation, but cremation also occurs, often side by side. "Pottery as a grave good in *tarand*-graves is only known in the earliest contexts ... This is exclusively Ilmandu-type ceramics" (Lang 2007: 187). The early *tarand*-graves contain also some objects that are exceptional in Estonia, notably several types of ornaments originating from the Upper and Mid-Volga region (cf. Lang 2007: 184–185).

The Akozino-Mälar axes were in Finland, Estonia and Sweden copied in iron (Asplund 2008: 245–246). Iron was at that time rare and highly valued, and the technology of its production was kept a well-guarded secret. Such esoteric knowledge, along with exclusive access to prestige goods, which were symbols of rank and power, have often guaranteed the elites their position in chiefdom-level societies (which normally involve populations of thousands or tens of thousands). The chiefdom system is usually connected with warring, and the Netted Ware cultures of Early Iron Age Russia were both very well armed (cf. Khalikov 1977; Patrushev 2000) and possessed hill forts (*gorodishche*) (for a good description of the D'yakovo hill fort, the D'yakovo culture type site situated in the city of Moscow, see Krenke 2011). Southwestern Finland and Estonia also had their hill forts. Twenty early metal period hill sites are known from Finland, and 1000–400 BCE is the earliest of their main periods of utilization (cf. Asplund 2008: 111).

The Akozino-Finland-Mälaren connections have an interesting parallel in the Late Bronze Age/Early Iron Age site of Vistad in Östergötland, where a fortified settlement has Lusatian-type houses and high quality Lusatian type pottery and other artefacts proving the presence of foreigners. Vistad has been interpreted as probably due to close relations that the local Swedish chiefs had with the Lusatian chiefs in Poland, accommodating regular visits of long-distance traders (cf. Asplund 2008: 214–215). Visiting traders who wished to settle in an attractive place could establish matrimonial relationships with local chiefs who were eager to get access to coveted goods and become members of a distribution network that could guarantee them even military assistence. Introduction of the strongly hierarchical chiefdom system can quickly change the pre-existing social order and lead to major language shifts. (Cf. Earle 1987; Atkinson 1989; Mallory 2001: 360).

In the case of Finnic, one problem has been the origin of the massive amount of Proto-Baltic loanwords connected especially with agriculture and animal husbandry. This problem is solved by assuming that the coastal population descending from the Kiukais and Paimio cultures in Finland and their Estonian counterparts with the (early western) Textile ceramics and Asva ceramics were Proto-Baltic speaking (cf. also Kallio 2007: 244–246; 2008). These areas form a continuation of the Baltic-speaking areas further south, and have been in contact with each other ever since the times of the Corded Ware.

On the other hand, derivation of Finnic from the Mid-Volga, from the neighbourhood of the Netted-Ware-derived (cf. Gusakov & Kuz'minykh 2007) ***Gorodets culture*** (c. 800 BCE – 800 CE) that can be correlated with Mordvin (cf. Kuz'minykh 2006: 82–84), fits a number of innovations shared by Finnic and Mordvinic protolanguages. Grünthal (2007: 123–130) gives detailed evidence of grammatical innovations shared by Mordvinic and Finnic, both in noun paradigms as a whole and the form and function of individual cases. Jaakko Häkkinen (2009: 37–40) notes other innovations common to Finnic and Mordvinic, which suggest a substratum influence. Both language groups have differently from each other adjusted the geminate **mm* that is foreign to Proto-Uralic phonotaxis, and that occurs in a lexical innovation found in Finnic and Mordvin aIone: replacement of the old Uralic numeral **luka* 'ten' with **kümmen* 'ten'. Häkkinen enumerates a number of loanwords in Finnic and Mordvin which have non-Uralic consonant clusters and lack a counterpart in Saamic, appear to be older than the Baltic loanwords, and relate to farming ('cow', 'mortar', possibly 'wheat') and to trees that belong to regions south of the Ladoga-Volga line ('oak', 'maple', 'hazelnut'). Häkkinen suggests that the substratum belonged to the vanished Palaeo-European languages — possibly the language of the Volosovo culture. The Finno-Mordvinic protolanguage can be expected to have received many Proto-Iranian loanwords from the neighbouring Pozdnyakovo culture of the Oka basin and later cultures of the steppes, which would have continued to influence Mordvinic.

That the substratum words of Finno-Mordvinic are lacking in the Saamic protolanguage may be due to the fact that the Netted Ware reached Finland and Karelia as early as by 1800–1700 BCE, very soon after the formation of the Netted Ware. Saami has its own substratum loanwords with non-Uralic phonotaxis that are likely to have come from the earlier cultures of these northern regions. The early and wide distribution of the Netted Ware suggests that several local variants of its language developed and may have died out in the course of time. Ante Aikio (2006: 42–47) proposes southern Finland as the homeland of Proto-Saami, which would have disintegrated around 0–500 CE, while the homeland of a now extinct Para-Saami would have been south of Lake Ladoga and Lake Onega. In Lapland, Saami was influenced by an extinct Palaeo-European substratum, but on linguistic grounds the expansion of Saami there could have taken place at the very earliest with the spread of the Kjelmøy Ware 650 BCE suggested by Carpelan, but more likely in the early centuries CE (cf. Aikio 2004; 2006: 43–47). Saami may have been in contact with Proto-Permic that was almost certainly spoken in the Anan'ino culture, because there was considerable Anan'ino influence on northern Fennoscandia in the Early Iron Age (cf. Kuz'minykh 1996).

Proto-Uralic

Proto-Finnic and Proto-Mordvinic, which share many innovations, are according to the above archaeological correlations about a millennium younger than Proto-West-Uralic, from which the ancestor of Proto-Saami branched off almost immediately. Proto-Finnic has changed in its phonemic (as well as morphemic and syntactic) structure quite a lot in comparison to what was previously thought to be the Saami-Finnic protolanguage, but which can now be labeled Proto-West-Uralic, while the latter has preserved the Proto-Uralic phonology (cf. Sammallahti 1988) virtually unchanged (cf. Itkonen 1984; Lehtinen 2007: 94; Kallio 2007).

The virtual identity of Proto-West-Uralic and Proto-Uralic suggests that Proto-Uralic has spread *fast,* in all likelihood in the same way as was above suggested for the migration of Proto-Finnic from the Mid-Volga to southern Finland (and to eastern central Sweden, where the Finnic language of the immigrants was assimilated into Proto-Germanic), namely through the elite dominance of incoming warrior traders. The northwards spread of the Netted Ware coincided with the operation of the ***Sejma-Turbino intercultural trader network*** (c. 1900–1600 BCE) (cf. Carpelan & Parpola 2001: 99; Carpelan 2002b: 198) (Figure 8). This means that Pre-Proto-Saami probably came to southern Finland together with the Sejma-Turbino artefacts, brought there by warrior-traders belonging to the elite of the Netted Ware culture that had formed shortly before this in the Upper Volga area. This Netted Ware elite had most likely come into being in the same way, as a result of the arrival of Sejma-Turbino traders from further east, from the Urals production centre of the Sejma-Turbino weapons.

The spread of the Uralic protolanguage with the Sejma-Turbino network is suggested by its temporal closeness to the disintegration of Proto-Uralic, which must be posterior to its adoption of Proto-(Indo-)Aryan loanwords, and has been suggested on these grounds by Petri Kallio (2006) and Jaakko Häkkinen (2009: 49–50). Kallio's (2006: 16–17) further reasonings are worth repeating *in extenso* (in my translation from his Finnish):

> Tapani Salminen (1999: 20–21) has observed from the point of view of Uralic dialectology that "the chain of Uralic language groups has apparently come into being while the speaking area of the protolanguage has fairly quickly spread along a certain ecological zone both towards the east and towards the west." It is interesting to compare this with what Christian Carpelan (1999: 270; cf. also Carpelan & Parpola 2001: 99–111) says happened soon after 2000 BCE: "Bronzes of the Sejma-Turbino type started spreading to the zone that more or less followed the southern border of the fir tree area and extended in the east to the upper reaches of the Yenisei and Ob rivers and in the west to Estonia and Finland." Coincidence or not, the branches of the Uralic language family emerged later precisely among the same long but very narrow zone formerly occupied by the Sejma-Tubino phenomenon. Carpelan (2000: 27) has accordingly already put forward what he himself calls a 'provocative guess', that the preform of Samoyedic would have spread to the Sayan area with the Sejma-Turbino phenomenon. I would like to propose

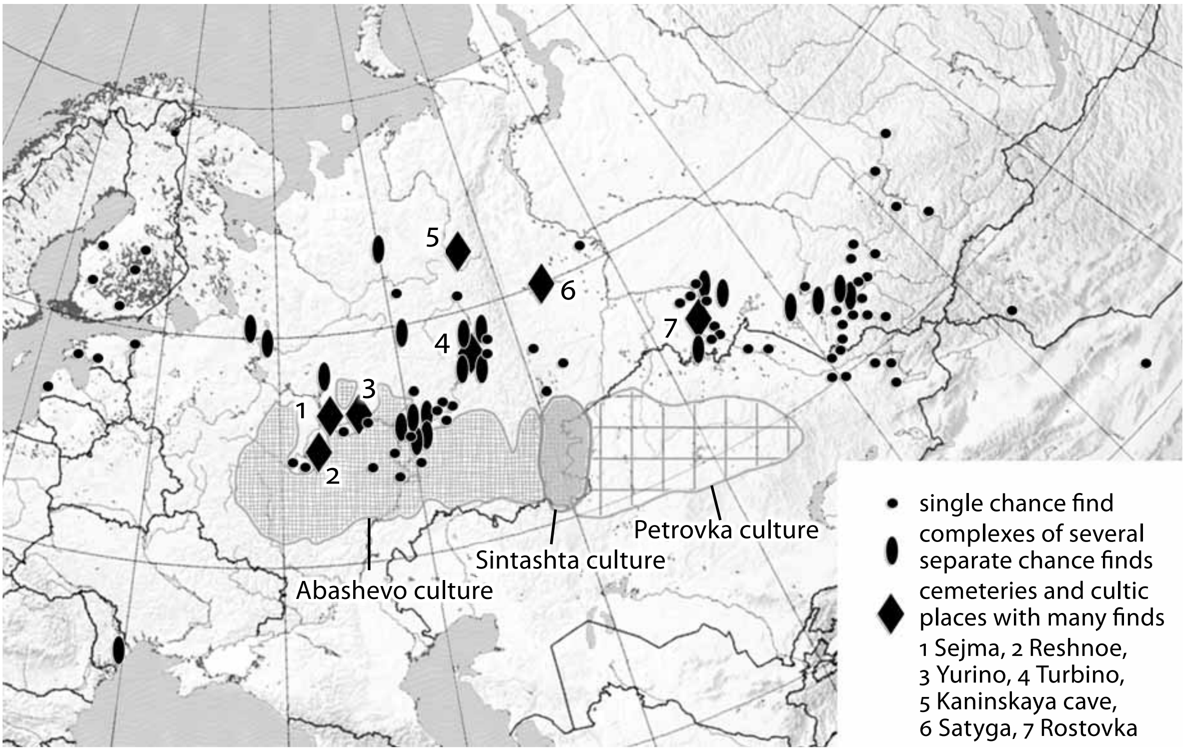

Figure 8. Find spots of artefacts distributed by the Sejma-Turbino intercultural trader network, and the areas of the most important participating cultures: Abashevo, Sintashta, Petrovka. Based on Chernykh 2007: 77.

> as my own provocative guess that the preforms of Baltic Finnic and Saami spread to the sphere of the Baltic Sea as late as about 1900 BCE with the Sejma-Turbino phenomenon. This guess would be all the more motivated as the Sejma-Turbino phenomenon spread to the west at least partly hand in hand with the strong wave of Netted Ware influence. Yet, as far as I can see, the spreading of Proto-Uralic needed nothing more than 'a production and network chain of armed traders' (Carpelan 1999: 270; cf. also Salminen 1999: 20–23), although some archaeologists even speak of 'Sejma-Turbino tribes' (Chernykh 1992: 215).

Indeed, as indicated above, and suggested also by Mallory (1998; 2001: 359–364; 2002), the Proto-Indo-European language probably largely spread through language shifts that followed initial bilingualism when local leaders came to the side of smallish but powerful groups of PIE speaking immigrants with a strong hierarchical system of social order. Joining the powerful network of foreign chiefs who had good weapons and military backing plus widely appreciated luxury goods as external marks of their power would guarantee local leaders keeping their former position and other advantages. The loyalty of the new members of the network could be guaranteed by matrimonial alliances.

The formation and cultural affinity of the Sejma-Turbino network has been, and continues to be, much debated. (The principal works on Sejma-Turbino network are Chernykh & Kuz'minykh 1987; 1989; 1994; Chernykh 1992: 190–234; 2009; and Kuz'minykh 2011, with new material; cf. also Carpelan & Parpola 2001: 99–111; Parzinger 2006: 257, 272, 280–312, 336; and Koryakova & Epimakhov 2007: 104–110.) From the Urals to the east, the chain of cultures associated with this network consisted principally of the following: the *Abashevo culture* (extending from the Upper Don to the Mid- and South Trans-Urals, including the important cemeteries of Sejma and Turbino), the *Sintashta culture* (in the southeast Urals), the *Petrovka culture* (in the Tobol-Ishim steppe), the *Taskovo-Loginovo* cultures (on the Mid- and Lower Tobol and the Mid-Irtysh), the *Samus' culture* (on the Upper Ob, with the important cemetery of Rostovka), the *Krotovo culture* (from the forest steppe of the Mid-Irtysh to the Baraba steppe on the Upper Ob, with the important cemetery of Sopka 2), the *Elunino culture* (on the Upper Ob just west of the Altai mountains) and the *Okunevo culture* (on the Mid-Yenissei, in the Minusinsk plain, Khakassia and northern Tuva). The Okunevo culture belongs wholly to the Early Bronze Age (c. 2250–1900 BCE), but most of the other cultures apparently to its latter part, being currently dated to the pre-Andronovo horizon of c. 2100–1800 BCE (cf. Parzinger 2006: 244–312 and 336; Koryakova & Epimakhov 2007: 104–105).

The majority of the Sejma-Turbino objects are of the better quality tin-bronze, and while tin is absent in the Urals, the Altai and Sayan mountains are an important source of both copper and tin. Tin is also available in southern Central Asia. Chernykh & Kuz'minykh have accordingly suggested an eastern origin for the Sejma-Turbino network, backing this hypothesis also by the depiction on the Sejma-Turbino knives of mountain sheep and horses characteristic of that area. However, Christian Carpelan has emphasized that the local Afanas'evo and Okunevo metallurgy of the Sayan-Altai area was initially rather primitive, and could not possibly have achieved the advanced and difficult technology of casting socketed spearheads as one piece around a blank. Carpelan points out that the first spearheads of this type appear in the Middle Bronze Age Caucasia c. 2000 BCE, diffusing early on to the Mid-Volga-Kama-southern Urals area, where "it was the experienced Abashevo craftsmen who were able to take up the new techniques and develop and distribute new types of spearheads" (Carpelan & Parpola 2001: 106, cf. 99–106, 110). The animal argument is countered by reference to a dagger from Sejma on the Oka river depicting an elk's head, with earlier north European prototypes (Carpelan & Parpola 2001: 106–109).

Also the metal analysis speaks for the Abashevo origin of the Sejma-Turbino network. Out of 353 artefacts analyzed, 47% were of tin-bronze, 36% of arsenical bronze, and 8.5% of pure copper. Both the arsenical bronze and pure copper are very clearly associated with the Abashevo metallurgy. While the tin-bronze dominates in Siberia, it covers less that 30% of the European artefacts; arsenical bronze covers 45% and pure copper 10% of the European material, but their distribution in Siberia is very small (cf. Chernykh 1992: 222–224). However, objects made of pure copper have been found in the Altai (cf. Chernykh & Kuz'minykh 1987: 94, map 20) suggesting the arrival of initial prospectors from an early phase of the Uralic Abashevans not yet mining arsenical copper.

The Abashevo metal production was based on the Volga-Kama-Belaya area sandstone ores of pure copper and on the more easterly Urals deposits of arsenical copper (Figure 9). The Abashevo people, expanding from the Don and Mid-Volga to the Urals, first reached the westerly sandstone deposits of pure copper in the Volga and Kama basins, and started developing their metallurgy in this area, before moving on to the eastern side of the Urals to produce harder weapons and tools of arsenical copper. Eventually they moved even further south, to the area richest in copper in the whole Urals region, founding there the very strong and innovative Sintashta culture. I suggest that while the majority of the Proto-(Indo-)Aryan elite moved to the eastern side of the Urals, the Aryan speakers remaining in the Volga-Kama area of pure copper, now less numerous, started speaking Proto-Uralic as their first language, but retained an ability to

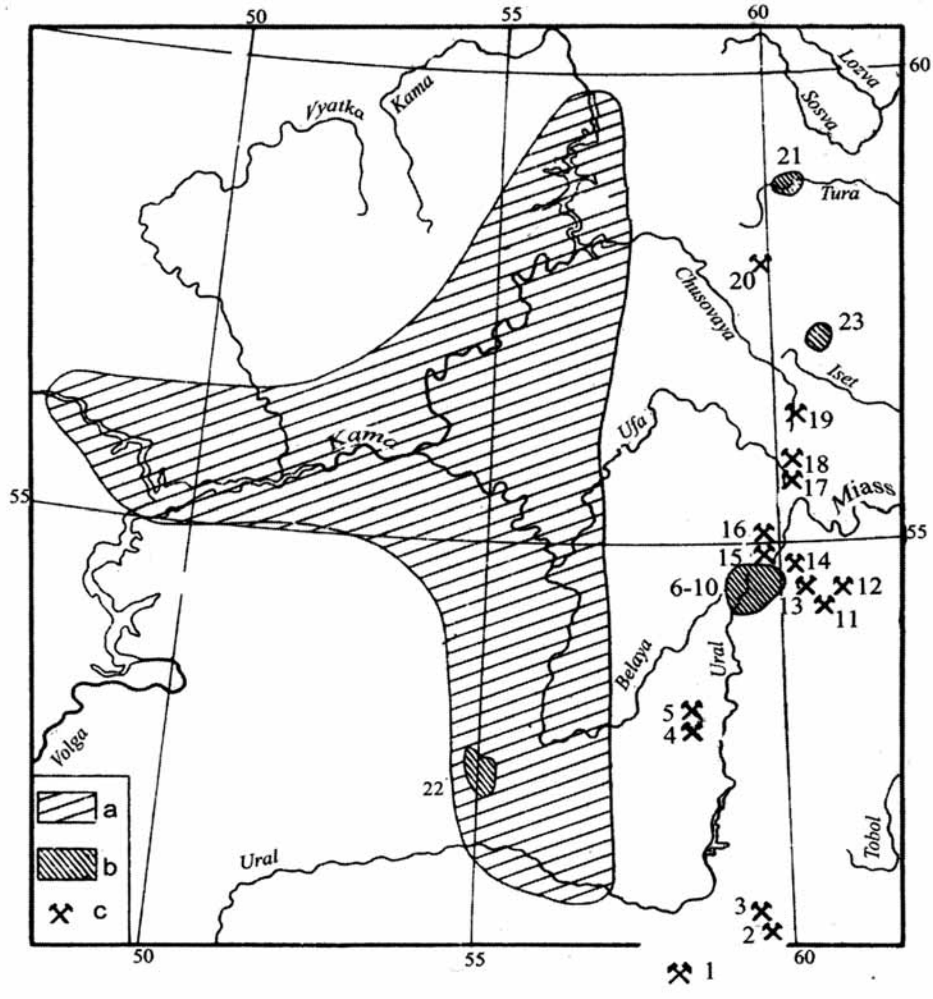

Figure 9. Distribution of the Urals copper deposits: (a) area of copper sandstone ores, (b) groups of mines, (c) copper deposit. After Koryakova & Epimakhov 2007: 29, fig. 1.1.B, where the names of the 23 numbered deposits are given; based on Chernykh 1970.

communicate in Proto-(Indo-)Aryan with the emerging eastern wing of the Sejma-Turbino network. In this way Proto-Uralic would have become the language of the European side of the Sejma-Turbino metal production and its network of warrior traders there. The Siberian side of the Sejma-Turbino network, with its tin-bronze production, undoubtedly was in the hands of the Proto-(Indo-)Aryan speakers of the very strong Sintashta and Petrovka cultures.

If these considerations hold good, the Proto-Uralic speakers would have descended from the Chalcolithic cultures of the Kama-Vyatka basins, the ***Novo-Il'in, Garino-Bor, and Yurtik cultures*** (cf. Nagovitsin 1987) and possibly also their neighbours in the Belaya basin. These in turn would have descended from the sub-Neolithic ***Volgo-Kama and Kama cultures*** (cf. Krizhevskaya 1996). In the maps of Oshibkina (1996: 138–139), the neighbouring culture of the Belaya basin is the ***Dnepro-Èlb*** alias ***Agidel'***. Carpelan (2006: 84), in a passage already quoted above, points out that the Early Mesolithic population of the Kama-Ural region hails from the south or southeast Europe, and has no connection with the post-glacial populations coming from the western and central European refugia. The identification of the Volgo-Kama and Kama cultures as the homeland of Early Proto-Uralic places it rather close to the assumed homeland of Early Proto-Indo-European, the Khvalynsk culture of the Samara region on the Lower Volga. The very earliest recognizable loanwords of Proto-Uralic are from Early PIE (cf. Koivulehto 1991; 1999ab; 2000; 2001).

The type site Turbino of the Sejma-Turbino network is situated on the Kama river, and the Garino-Bor culture was originally called the *Turbino culture* (cf. Bader 1961; Gimbutas 1965: 611–647); the name was later changed so as not to confuse the Garino-Bor culture with the Sejma-Turbino network. From the 1950s to 1970s, the leading Russian archaeologists specializing in the Kama region (Otto N. Bader, P. N. Tret'yakov, his son V. P. Tret'yakov and A. Kh. Khalikov) thought that the Volosovo culture resulted from a massive westward expansion of the Garino-Bor culture, and they placed the original homeland of the Uralic languages in the Kama-Vyatka area. Later archaeological research has however suggested that the similarities between these two cultures do not date from the beginning of the Volosovo culture but are due to a later expansion of the Volosovo culture into the Kama-Vyatka area (cf. Krajnov 1987a: 25–26). Yet "all the Volosovo metalwork is made from chemically extremely pure copper, fully comparable with the copper-bearing sandstones of the western Ural region (Chernykh and Kuzminykh 1977). A very similar picture emerges from the numerous settlements of the Garin[o]-Bor culture. The metal forms are also very limited..." (Chernykh 1992: 187). Jaakko Häkkinen (2012: 95) has pointed out that the people of the Garino-Bor culture, who possessed the metal sources, have a much greater possibility to be correlated with Proto-Uralic speakers than the Volosovo people who until the late phase of their culture lacked metal sources.

Kallio (2004: 131–133; 2006: 7) and Häkkinen (2009: 25–28, 50; 2012: 95) have added a weighty argument supporting these considerations. Proto-Uralic had native terms connected with metallurgy, as well as terms connected with trade involving precious artifacts and social elite borrowed from Proto-(Indo-)

Aryan. The most important native term is **wäśka* ‘copper/bronze’, which has become **wesä* in Proto-Samoyedic. In addition Proto-Uralic had two terms for ‘tin’ or ‘lead’, **äsa* and **olna/*olni,* of which the former occurs in the compound **äsa-wäśka* and thus clearly denotes an alloy of copper (cf. also Napol’skikh 2009). Uralic **weŋći* ‘knife’ may have been borrowed into Early Proto-Aryan to become Late Proto-Aryan **wāćī* ‘knife, awl, axe’. Proto-(Indo-)Aryan loanwords in Proto-Uralic include the numerals 100 (**śata/*śëta* < **ćata-/*śata-*) and 1000 (**śosra* < **źhasra-*) and **asera/*asira* ‘prince, lord’ < **asura-* ‘lord’. The metal term **sërńa* ‘gold’ is from Proto-Iranian **zaranya-* and probably slightly later (possibly from the short period when the Abashevo area was taken over by the early Srubnaya or Timber Grave culture).

It seems clear that **wäśka* harks back to the primitive native metallurgy, while **äsa-wäśka* denotes the tin-bronze produced in, and imported from, the eastern wing of the Sejma-Turbino network. To the above words I would like to add Proto-Uralic **ora* ‘awl’ from Proto-Indo-Aryan **ārā* ‘awl’ (cf. Koivulehto 2001: 248; note that the word is not attested in Iranian). Yet another word for a metal object is probably Proto-West-Uralic **waśara* ‘hammer, axe’, from Proto-(Indo-)Aryan **waj’ra-* ‘weapon of the war-god’ (cf. Parpola 2005a: 25) originally denoting the axe or mace of the Sejma-Turbino warriors. The Proto-Indo-Aryan compound **madhu-śišta-*, preserved in Sanskrit *madhu-śiṣṭa-* ‘beeswax’, literally ‘what is left over of honey’, survives in Komi *maśis* ‘beeswax’, and the latter part of the compound is found also in Mordvin Mari and Udmurt with the meaning ‘beeswax’. This word denotes material important for metal casting, and this word (or even the verb *śis-* ‘to leave’ from which it is derived) has no cognate in any of the Iranian languages. (Cf. Carpelan & Parpola 2001: 123–126; for the absence of an Iranian counterpart to Proto-Indo-Aryan **śiš-* to leave’, cf. Cheung 2006: 328.) The word for ‘honey’ has been borrowed into Proto-Uralic already from Early Proto-Aryan **medhu-* as **mete-*; it was used to prepare alcoholic drinks, which played an important role in the life of the early Indo-European and Aryan elites and were part of their chiefdom rituals (cf. Carpelan & Parpola 2001: 115–122; Parpola 2005a: 39–41; 2008: 45–48; Sherratt 1987; 1997: 376–402). Proto-Uralic **arva-* ‘price, value’ comes from Proto-Aryan **argha-* ‘price, value’ (Koivulehto 1999a: 216). Also several central Proto-Aryan religious terms have become part of Proto-Uralic, including **juma-* ‘god, hightest god, heaven’ < **dyuma(n)t-* ‘heavenly, shining, epithet of Indra, the god of thunder and war’ (cf. Koivulehto 1999a: 228), Proto-Finnic **sampas* ‘pillar, world pillar’ < Proto-Indo-Aryan **stambha-s* ‘pillar, world-pillar (cf. Koivulehto 1999: 230; Parpola 2005a: 36–54).

After Paasonen (1923: 17), many Uralists, especially Péter Hajdú (1964; 1969; 1975; 1987), have placed the Uralic homeland in the neighbourhood of the Ural mountains, because Proto-Uralic had words for the Cembra pine, **sïksi*, and the Siberian fir, **ńulka*, and these trees do not grow west of the Kama and Pechora rivers. Jaakko Häkkinen (2009: 34–37 and 43–44; cf. also Janhunen 2009: 71) emphasizes that these words cannot have entered the Uralic protolanguage or its preforms in a region where these trees were unknown.

Häkkinen (2009: 33–34) also repeats the old argument (cf. Napol'skikh 1995: 3) that the original homeland of a language family is likely to be where its earliest branching has taken place, and this principle points to the Kama-Vyatka area. This agrees also with the idea of "centre of gravity" employed in determining homeland areas (cf. Mallory 1989: 152–153 and Figure 3 above), whereas the earlier assumed Volosovo homeland is on the western side of the language continuum. According to Häkkinen's novel analysis (2007, 2009), the disintegration of Proto-Uralic did not start with the separation of the Samoyedic branch, but with the division of Proto-Uralic into a western, central and eastern group. Until recently, "Finno-Ugric" has denoted the other main branch of the Uralic language family as opposed to "Samoyedic". With the inclusion of Samoyedic in the Ugric branch, as in this paper, this early node of the family tree disappears and "Finno-Ugric" becomes synonymous with "Uralic".

If the above considerations are right, the early Indo-Iranian loanwords in Proto-Uralic should date from between c. 2250 and 1600 BCE. These loanwords attest to an earlier and a later stage of development, the former represented by such Proto-Uralic words as **mekše* 'bee', **kekrä* 'circular thing, cycle', **kesträ* 'spindle', the latter by **ćata/*śata* 'hundred' (cf. Koivulehto 2001). The earliest contact with Early Proto-Indo-Aryan seems to have taken place between the mid-Volga and the Urals (Abashevo and related cultures), while the earliest contact with Early Proto-Iranian (and West Uralic) seems to have taken place in the Upper Volga region (Pozdnyakovo culture).

Central Uralic: Mari (Cheremish) branch

The Mid-Volga ***Chirkovo culture*** (c. 1800–800 BCE) resulted from the fusion of the cultures which had during the Early Bronze Age occupied the area between the mouth of Oka and Vyatka: Volosovo, Balanovo and Abashevo. Its early phase includes the cemetery of Sejma on the Lower Oka, one of the type sites of the Sejma-Turbino network. It is significant that there is evidence also of the presence of people belonging to the Krotovo culture, one of the participants of the Sejma-Turbino network far away in Siberia (from the forest steppe of the Mid-Irtysh to the Baraba steppe on the Upper Ob, with the important cemetery of Sopka 2) (on the Chirkovo culture, cf. Khalikov 1987a). I have already discussed the transformation of the Chirkovo culture into the ***Akozino-Akhmylovo culture*** (c. 800–300 BCE) as a result of the Netted Ware expansion around 1000 BCE, and suggested that part of the immigrant Netted Ware elite traded Akozino-Mälar axes to Finland and eastern central Sweden around 800–500 BCE and introduced the Finnic language there. This language of the Netted Ware elite, along with the later influence of Mordvin-correlated Gorodets culture, should have given some West Uralic tinge to the future Mari language, which in the sequel developed in close contact with the Proto-Permic language of the neighbouring Anan'ino culture. Both Akhmylovo and Anan'ino were important centres of metallurgy that had close relations with the Iranian-speaking cultures of the steppe.

Central Uralic: Permic branch

The ***Kazan (Prikazan) culture*** (c. 1900–800 BCE) in the Vetluga-Volga-Vyatka interfluve came into being on the basis of the immediately preceding eastern Volosovo/Garino-Bor culture (from which it inherited all principal elements of its culture), but with a strong and clear influence from the local Abashevo and Early Srubnaya (Pokrovo) cultures (cf. Khalikov 1980: 52a; 1987b). The bronzes of the first phase are of the Sejma-Turbino type. The Kazan culture eventually comprized the Kama and Belaya basins as well as areas of the Mid-Volga nearly up to Samara in the south.

Via its final ***Maklasheevka*** phase (c. 1000–800 BCE), the Kazan culture was succeeded by the powerful ***Anan'ino culture*** (c. 800–200 BCE).

With its flourishing metal industry the Anan'ino culture exerted much influence both east and west, to the Urals as well as to northern Fennoscandia (cf. Patrushev 2000: 89–99; Koryakova & Epimakhov 2007: 252–261; Lavento 2001: 38; Kuz'minykh 2006). "It is commonly accepted by archaeology, ethnography, and linguistics that the ancestors of the Permian peoples (the Udmurts, Komi-Permians, and Komi-Zyryans) left the sites of Ananyino cultural intercommunity" (Koryakova & Epimakhov 2007: 260). The sudden upsurge of the Anan'ino and Akhmylovo cultures around 800 BCE is associated with the connections that from the beginning they had with the Iranian-speaking cultures of the southern steppes (cf. Koryakova & Epimakhov 2007: 194; Smirnov 1998).

The Anan'ino culture eventually split into two cultures connected with Proto-Udmurt and Proto-Komi respectively, namely the ***P'yanobor culture*** (c. 300 BCE – 200 CE) on the Vyatka, Mid- and Lower Kama, and Lower Belaya rivers (cf. Koryakova & Epimakhov 2007: 261–273; Patrushev 2000: 162–171; Ageev 1992), and the ***Glyadenovo culture*** (c. 200 BCE – 500 CE) on the Upper Kama (cf. Koryakova & Epimakhov 2007: 273–276; Kuz'minykh 2006). Continuing the Anan'ino tradition, the P'yanobor culture exerted some influence as far west as Finland (cf. Carpelan 2006: 87). Even in the 7th and 8th centuries CE, Finland received Permian imports coming from the ***Lomovatovo culture*** on the Kama (cf. Hirviluoto 1986).

East Uralic (Proto-Ugro-Samoyedic)

East Uralic is posited by Jaakko Häkkinen (2009: 11–16) on the basis of several phonological innovations that the Samoyed languages share with the Ugric languages. This implies some period of separate East Uralic existence before the Samoyed languages moved far to east.

The Abashevo culture, and the Srubnaya culture that briefly succeeded it, extended as far east as the Tobol; some of the most important sources of copper of the Abashevo culture were on the eastern side of the Urals (cf. Figure 7). The copper and the pastures attracted the steppe nomads of the Andronovo community to the forest steppe of the Trans-Urals, first the Alakul' (c. 2000–1800 BCE), then the Fëdorovo (c. 1850–1450 BCE) (cf. Parzinger 2006: 257–261; 357–361).

The strong Fëdorovo influence on the Late Garino-Bor culture resulted in the emergence of the ***Cherkaskul' culture*** (c. 1850–1500 BCE) in Bashkiria (where it had the related Kazan culture as its western neighbour) and the Mid- and South Trans-Urals (up to the Lower Ishim in the east), that is, the southern forest and northern forest-steppe on both sides of the Ural mountains. About half of the bone finds come from hunted animals, attesting to a predominantly local hunter-fisher population (cf. Kosarev 1981; 1987; Parzinger 2006: 361–364; Koryakova & Epimakhov 2007: 151–154). Cherkaskul' pottery is mostly found at settlements and in the forest zone, quite often together with Fëdorovo pottery, and many sites have produced also pottery mixing the characteristics of Cherkaskul' & Fëdorovo types (cf. Chlenova 1981 and Figure 10).

Proto-Samoyedic

Christian Carpelan suggested that the Samoyed branch may have separated from Proto-Uralic in connection with the Sejma-Turbino trade network (cf. Carpelan 1999: 270; Carpelan & Parpola 2001: 109). With the Sejma-Turbino phenomenon now correlated with the disintegration of Proto-Uralic, I suggest a slightly later alternative solution that is in agreement with Jaakko Häkkinen's East Uralic as the source of both Proto-Ugric and Proto-Samoyedic.

Nataliya L'vovna Chlenova (1929–2009; cf. Korenyako & Ku'zminykh 2011) published in 1981 a detailed study of the Cherkaskul' pottery. In her carefully prepared maps of 1981 and 1984 (Figure 10), she plotted ***Cherkaskul' monuments*** not only in Bashkiria and the Trans-Urals, but also ***in thick concentrations on the Upper Irtysh, Upper Ob and Upper Yenissei,*** close to the Altai and Sayan mountains, precisely where the best experts suppose the homeland of Proto-Samoyed to be (cf. below). Some distance further west, on the Ishim river and north of the Baikal Sea, Chlenova's maps record concentrations of Cherkashkul' monuments along with Fëdorovo monuments.

Hermann Parzinger (2001) has discussed the Fëdorovo graves of southern Siberia (Minusinsk basin), concluding that they clearly represent a migration from the west. This is supported by their dating, c. 1850–1450 BCE according to Parzinger (2006: 381 and 357), but now more accurately dated from samples of human bone to c. 1680–1500 BCE (Svyatko et al. 2009: 251). The Fëdorovo graves and their goods including pottery have no local precedent, on the contrary they differ in all respects from the earlier local Okunevo culture (2400–1950 BCE in Minusinsk according to Svyatko et al. 2009: 249). The shape and ornamentation of the Fëdorovo pottery have developed from the Petrovka pottery of the southern Urals and northwest Kazakhstan, where they have a local Copper Age background. The target of this long migration may have been the local copper and tin resources, very important for the production of high quality weapons (cf. Parzinger 2006: 357). Parzinger also refers to southern Turkmenistan, where Fëdorovo pottery also testifies to a long distance migration. According to Chlenova (1981), Fëdorovo pottery occurs in the company of Cherkaskul' Ware in south Turkmenistan as well. Proto-Samoyed has a number of Aryan loanwords,

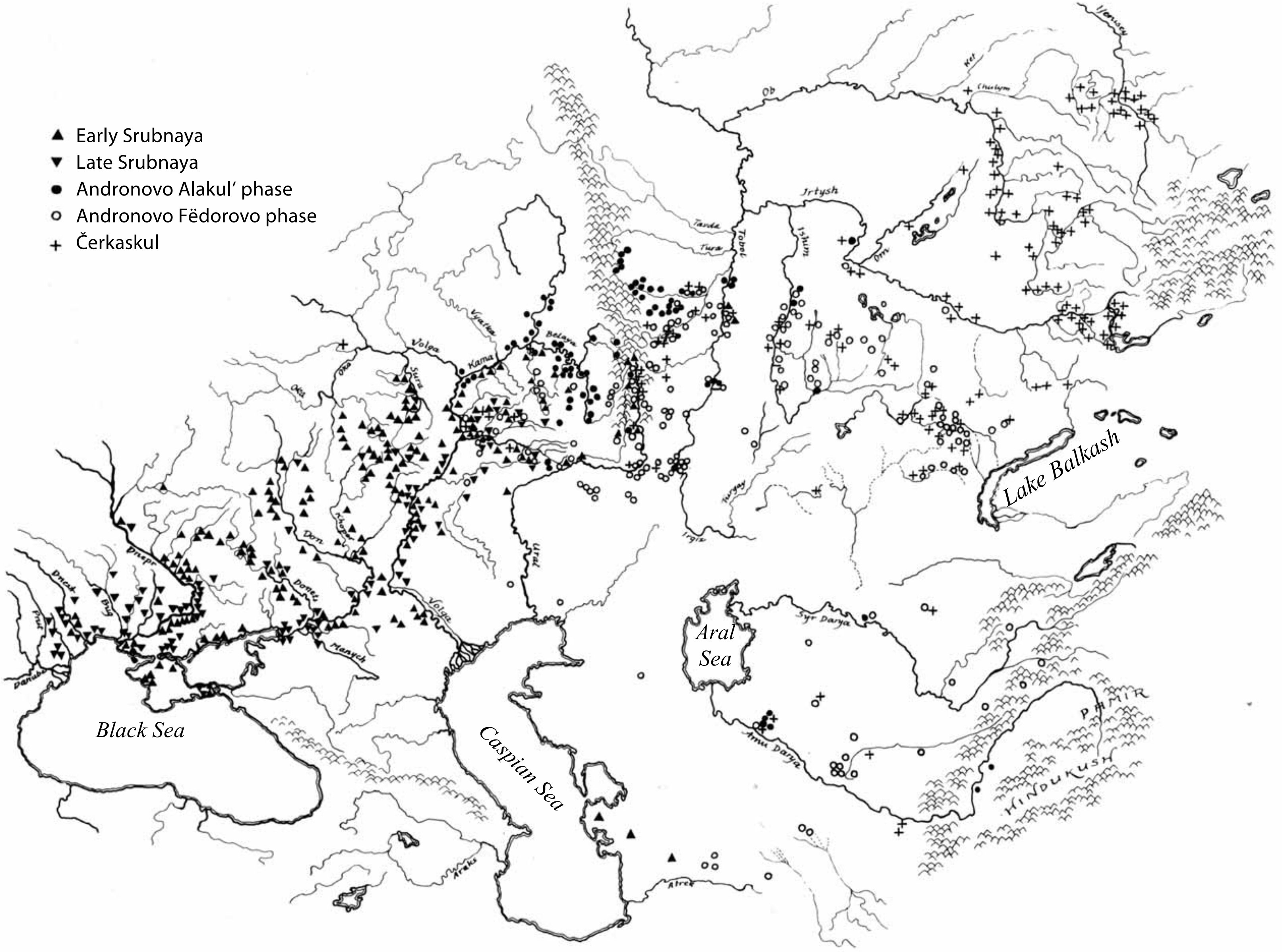

Figure 10. Distribution of Srubnaya (Timber Grave, early and late), Andronovo (Alakul′ and Fëdorovo variants) and Cherkaskul′ monuments. After Parpola 1994: 146, fig. 8.15, based on the work of N. L. Chlenova (1984: map facing page 100).

though in some cases clearly from the Iranian branch (cf. Lehtisalo 1924; Janhunen 1983); however, there are at least three examples of Aryan loanwords borrowed into Pre-Proto-Samoyed corresponding to the Proto-Uralic level (cf. Kallio, in press, footnote 4; cf. also Aikio 2002: 52; J. Häkkinen 2009: 25).

Juha Janhunen, author of the etymological dictionary of the Samoyed languages (1977), places the homeland of Proto-Samoyedic in the Minusinsk basin on the Upper Yenissei (cf. Janhunen 2009: 72). Mainly on the basis of Bulghar Turkic loanwords, Janhunen (2007: 224; 2009: 63) dates Proto-Samoyedic to the last centuries BCE. Janhunen thinks that the language of the ***Tagar culture*** (c. 800–100 BCE) ought to have been Proto-Samoyedic (cf. Janhunen 1983: 117–118; 2009: 72; Parzinger 2001: 80 and 2006: 619–631 dates the Tagar culture c. 1000–200 BCE; Svyatko et al. 2009: 256, based on human bone samples, c. 900 BCE to 50 CE). The Tagar culture largely continues the traditions of the *Karasuk culture* (c. 1400–900 BCE), which according to a widely accepted view came into being as a result of a migration of different people from the southeast, from the periphery of Shang period China. The beginning of the Karasuk period marked also the return of some Okunevo traditions that did not manifest themselves during the Fëdorovo period (cf. Parzinger 2001: 78). This intervention and subsequent assimilation of foreign people speaking a wholly different language can be expected to have had considerable influence on Proto-Samoyedic. In view of the Tokharian-like loanwords identified in Proto-Samoyedic (cf. Janhunen 1983) and vice versa (cf. Kallio's 2004), it is significant that in the Minusinsk basin, the Okunevo culture was preceded by the *Afanas'evo culture* (c. 2750–2450 BCE, cf. Svyatko et al. 2009: 247), in which an Indo-European language related to Proto-Tokharian was very probably spoken (cf. above on the Tokharian branch of Indo-European).

It appears, then, that the ancestors of the Proto-Samoyeds hailed from a large group of East Uralic speaking people of the Cherkaskul' culture. After adopting pastoralism, they became culturally assimilated within the Fëdorovo people who spoke Proto-Indo-Aryan. Keeping together as a group, however, they retained their Uralic language. The whole process has a good parallel in the Proto-Hungarians (see below).

Proto-Ugric

The Cherkaskul' culture was transformed into the genetically related ***Mezhovka culture*** (c. 1500–1000 BCE), which occupied approximately the same area from the Mid-Kama and Belaya rivers to the Tobol river in western Siberia (cf. Parzinger 2006: 444–448; Koryakova & Epimakhov 2007: 170–175). The Mezhovka culture was in close contact with the neighbouring and probably Proto-Iranian speaking *Alekseevka* alias *Sargary culture* (c. 1500–900 BCE) of northern Kazakhstan (Figure 4 no. 8) that had a Fëdorovo and Cherkaskul' substratum and a roller pottery superstratum (cf. Parzinger 2006: 443–448; Koryakova & Epimakhov 2007: 161–170). Both the Cherkaskul' and the Mezhovka cultures are thought to have been Proto-Ugric linguistically, on the basis of the agreement of their area with that of Mansi and Khanty speakers, who moreover in their Fëdorovo-like ornamentation have preserved evidence of continuity in material culture (cf. Chlenova 1984; Koryakova & Epimakhov 2007: 159, 175).

Proto-Mansi (Proto-Vogul)

The Mezhovka culture was succeeded by the genetically related ***Gamayun culture*** (c. 1000–700 BCE) (cf. Parzinger 2006: 446; 542–545). From Gamayunskoe descends the ***Itkul' culture*** (c. 700–200 BCE) distributed along the eastern slope of the Ural Mountains (cf. Parzinger 2006: 552–556). Known from its walled forts, it constituted the principal Trans-Uralian centre of metallurgy in the Iron Age, and was in contact with both the Anan'ino and Akhmylovo cultures (the metallurgical centres of the Mid-Volga and Kama-Belaya region) and the neighbouring *Gorokhovo* culture.

Proto-Khanty (Proto-Ostyak)

Proto-Khanty may have been spoken in the Late Bronze Age and Early Iron Age cultures related to the Gamayunskoe and Itkul' cultures that extended up to the Ob: the ***Nosilovo, Baitovo, Late Irmen', and Krasnoozero cultures*** (c. 900–500 BCE). Some were in contact with the Akhmylovo on the Mid-Volga. All these cultures of the forest steppe were later absorbed into the Sargat culture discussed below (cf. Parzinger 2006: 545–564, 679–681).

Proto-Hungarian

Hungarian belongs to the Mansic branch of the Ugric languages (cf. Janhunen 2009: 74). The Gamayunskoe culture also gave rise, via the ***Vorob'evo Group*** (c. 700–550 BCE) (cf. Parzinger 2006: 546–549), to the ***Gorokhovo culture*** (c. 550–400 BCE) of the Trans-Uralian forest steppe (cf. Parzinger 2006: 549–552). For various reasons the local Gorokhovo people started mobile pastoral herding and became part of the multicomponent pastoralist ***Sargat culture*** (c. 500 BCE to 300 CE), which in a broader sense comprized all cultural groups between the Tobol and Irtysh rivers, succeeding here the Sargary culture. The Sargat intercommunity was dominated by steppe nomads belonging to the Iranian-speaking Saka confederation, who in the summer migrated northwards to the forest steppe. (On the Gorokhovo and Sargat cultures, see Koryakova & Epimakhov 2007: 287–312.) A leading Hungarian archaeologist is happy with the following correlation of Proto-Hungarian: "Most scholars of western Siberian archaeology agree that the Sargatka culture ... can be plausibly identified with the proto-Hungarians... Around the 5th century BC the proto-Hungarians were caught up in a wave of migrations that swept the steppe ... Migrating westwards, they settled between the Urals and the Middle Volga region" (Fodor 1996: 13–14). Until about 600 CE, the Hungarians stayed in Bashkiria, called Hungaria Magna in medieval sources (cf. Fodor 1975: 72).

That the Ugric speakers were horsemen in ancient times is suggested by a number of equestian terms in the Ugric languages (cf. Hajdú 1987: 331–333). Particularly interesting is the word for 'horse', Hungarian *ló*, Mansi *lū*, Khanty *law* < Proto-Ugric **lox*, which is neither of Uralic nor Indo-European origin, nor does it agree with any of the other Eurasian words for 'horse': Proto-Yeniseic had **kuqs* and Proto-Turkic **(x)at*, while all East Asian terms (Mongolic, Tungusic, Korean, Chinese, Japanese, Burmese, etc.) go back to Pre-Proto-Mongolic **morï* (cf. Janhunen 1998: 415–416). I suggest that the Ugric word comes from the language of the *Botaj culture* (c. 3700–3000 BCE) of northern Kazakhstan, the steppe and forest steppe between Tobol and Ishim, the very region of the Sargat culture. This Copper Age culture was focused on horse-hunting: at the type site Botaj (which had more than 150 house pits), about 300,000 animal bones were found, 99.9% of them horse (cf. Anthony 2007: 216–217; Parzinger 2006: 213–220).

4. Conclusion

As in the case of the Indo-European languages, it is thus possible to derive all the main Uralic languages from a common homeland to their later speaking areas through a chain of genetically connected archaeological cultures. The sketched correlations also seem to fit well the evidence of areal contacts given by loanwords, confirming Häkkinen's new branching of the language family as well as suggesting dates for the nodes (Figure 11).

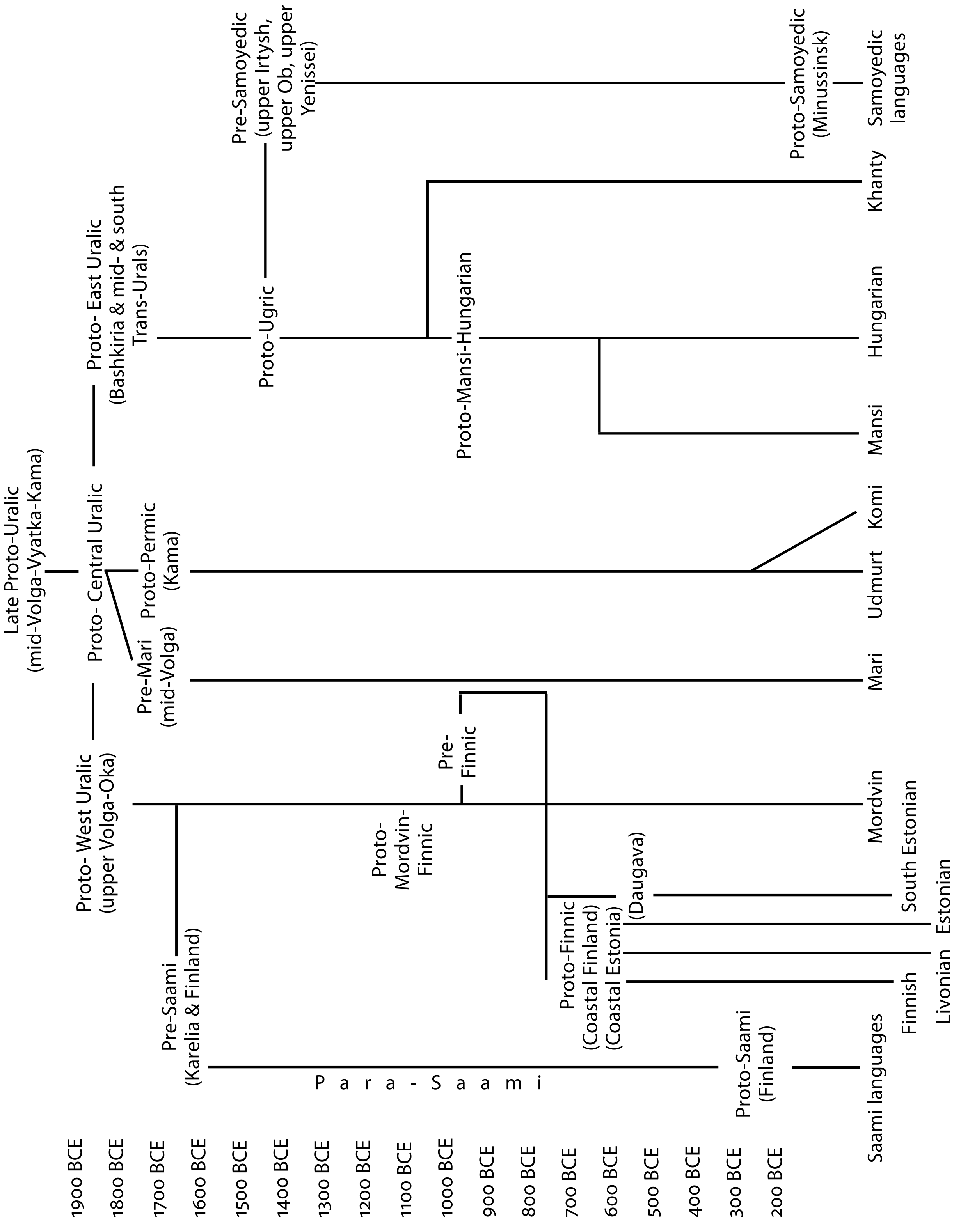

Figure 11. A new family tree for the Uralic languages with localization and approximate dates for branching, based on Jaakko Häkkinen's linguistic analysis and the present correlation with archaeology

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Early Metallurgy in Language: The History of Metal Names in Finnic[1]

In contrast to other continents, domestication of the horse made the inhabitants of the Eurasian steppes and forest steppes more mobile. Invention of smelting metals resulted in the mastering and use of more productive tools and more effective weapons. Metallic tools and weapons became important trade articles, and the vocabulary corresponding to these items spread over language and language family borders. Small nomadic or semi-nomadic mobile bands began to join together in order to raid, conquer new territories, and subjugate their neighbors. Other sedentary bands were forced to consolidate into larger groups in order to resist such attempts and practised a partly similar lifestyle. Unstable bands, tribes, and other minorities were assimilated into these larger consolidated groups. Whole languages and language families disappeared more quickly than earlier.

This article is an attempt to study metal names in the F-U languages starting from the very earliest point of their appearance in these languages. Although the Finnic languages are the focus of this study, the considerable, though weakly studied, background of this issue within the larger context of the Finno-Ugric languages is not ignored and is incorporated into an analysis seeking to identify shared features among the Finno-Ugric languages.

1. Metal names in Finno-Ugric

In the Finno-Ugric languages, most metal names are borrowings. In Table 1, the raised prefix letters indicate the origin of the names mainly following traditional views as expressed in Aulis J. Joki's important book "Uralier und Indogermanen" (1953) and in later etymological dictionaries, primarily in KÈSKJa, LÄGLOS, MNyTESz, MSzFE, UEW, SSA. Table 1 does not take into account etymologies presented in the posthumously published book by Hartmut Katz (2003), as many of them are vaguely argued and linguistically inadequate.

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[1] The study was supported by Estonian Science Council project No. SF0180076s08.

A Linguistic Map of Prehistoric Northern Europe.
Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 185–200.

In the following sections, the names of copper, gold, and iron in the Finno-Ugric languages will be analyzed in order to discuss the existing views on the contacts of the Finno-Ugrians at the beginning of Metal Ages, i.e. of the Bronze Age and Iron Age. Still it should be remembered that during the European Metal Ages the production of alloys like bronze or brass from different metals originating in different areas was based on longer local traditions of smelting copper, tin, or lead from a local ore.

Names for tin, lead, and silver will be discussed only inasmuch as they are etymologically related to names for copper or iron.

2. Names of gold

2.1. The Finnic and Saamic names for gold are borrowed from different Germanic sources. The Finnic name **kulta* is historically an older loan than the Saamic name **kullē* because in certain Scandinavian dialects the Proto-Germanic consonant cluster was simplified, cf. Proto-Germanic and Proto-Scandinavian **gulþa*, Gothic *gulþ*, Swedish and Danish *guld* vs. Old Norse, Icelandic, Faeroese, and Norwegian *gull* (cf., however, Old Swedish *goll* and Estonian Swedish *gull* as an indication that older and newer forms have existed side by side for a very long time). Old Swedish makes it possible to speculate that the Finnic form was received somewhere farther in the south from the historically attested Finnic area and the historically older forms may have been restored in one part of Swedish dialects due to language-external reasons.

2.2. Gold names in other Finno-Ugric languages are of Iranian origin. (Note that the Samoyedic languages are not discussed in the current paper.) The names for gold of Iranian origin are borrowed separately and from different sources (Joki 1973: 250). The words denoting ‘gold’ are listed in the first column from the left in Table 1. In addition, Iranian gold names have undergone a semantic shift in Moksha, Konda Mansi, Vah and Vasjugan Khanty and serve as copper names. The names can be divided into two layers.

In the oldest layer of borrowings, namely Hungarian *arany*, Vah Khanty *lōrńз*, Vasjugan Khanty *jōrńi*, and Moksha *śerəń*, the original Iranian initial consonant *z-*, cf. Avestan *zaranya* ’gold’, has been substituted by **s*. The Proto-Ugric **s* was lost in Hungarian, shifted to *ʌ*, and is still preserved as such in Kazym and Surgut dialects, and later regularly merged into *l* in Vah and into *j* in Vasjugan dialect. In Mansi, the Ugric **s* is represented as *t* as well as in Central Ob and Irtysh Khanty. Furthermore, it is possible that also Konda Mansi *tå̄reń* and Pelym Mansi *tariń* ’copper’ may belong to this series; still one cannot entirely exclude the possibility that these Mansi words go back to an Iranian source, such as Old Persian *daraniya* ’gold’. The same problem is true for the Pelym variant *tarńė* ’copper’.

All other Mansi and Khanty words denoting gold are characterized by a word-initial *s-* and represent a later layer of borrowings. As the initial *s-* in Ugric inherited vocabulary and old Indo-European loans originates from the earlier consonant **ś* and there is no known reason to suppose a palatalized sibilant in Iranian, the Mansi and Khanty words for gold are usually considered loans from Komi.

It must be noted that both layers contain phonological stems with the patterns *(C)VCVC* and *CVCC(V)*, of which gold names of the latter type are unknown in Iranian. Compared to them, the Moksha form *śerä̆* 'copper' may have risen as a result of local simplification of a longer form, although it may also be a direct loan, due to the fact that in the best known modern Iranian languages the shorter pattern *CVC* prevails, cf. Kurdish *zêr*, (New) Persian, Tajiki and Dari *zar*. Like in Finno-Ugric, there are back and front vocalic stem variants also in Iranian, cf. Avestan *zaranya*, Persian *zar* vs. Ossetic *zærin*, Kurdish *zêr*. No stem form with *i* in the initial syllable is attested in Iranian. However, the Sanskrit gold name *hiranya* has *i*. Hence, it is unclear whether the vowel of the first syllable in Erzya *si̯rńe* and Moksha *śirńe* reflects a similar phonological form or pronunciation of an Iranian source language or whether it results from a local change. The great variation in West Iranian languages such as Avestan, Kurdish, Persian, Tajiki may be late, but this can neither be proven nor refuted. There is no evidence on the pattern variation in Northwest Iranian in which the word is attested only in Ossetic. There seems to exist only one Iranian language where the stem has the pattern CVCVC, namely Ossetic *zærin*.

Thus probably the set of separate loans denoting 'gold' from Iranian includes up to six stem types: (1a) Moksha *śerəń*; (1b) Konda Mansi *tå̄reń*; (1c) Hungarian *arany*; (1d) Vah Khanty *lōrńз* 'copper', Vasjugan Khanty *jōrńi* 'copper', Surgut Khanty *ʌŏrńi̯* - 'brass';[2] (2a) Erzya *si̯rńe*, Moksha *śirńe*, Mari *šörtńö* (< **serńe*; -*t*- maybe inserted by analogy of *körtńö*, *kərtńi* 'iron'); (2b) Permic *zarńi*, Mansi and Khanty *sVrńV*. In other words, in order to borrow the first type (1a–d), at least two Finno-Ugric languages or dialects must have been in contact with Iranian and at least two Finno-Ugric languages or dialects must also have been in contact with Iranian in order to receive the stems of the second layer (2a–b). To explain this variation in Finno-Ugric, Hartmut Katz (2003: 258) tries to derive all types from different stages of Proto-Iranian. Nevertheless, it is to be noted that all these hypothetical stages altogether cannot adequately reflect a meaningful history of a single Iranian language, such as Ossetic. Conclusively, there must have been different contacts with Iranian languages.

Finally, on the basis of the geographical distribution of gold names the Finno-Ugric linguistic area is divided into two zones, namely into (a) Saamic and Finnic that borrowed the word for 'gold' from the Germanic languages, and (b) into Mordvinic, Mari, Permic, and Ugric in which the word denoting 'gold' was borrowed from the Iranian languages. The first zone is the sphere of Germanic influences and the second zone the sphere of Iranian influences.

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[2] In Krasnoyarskiy Irtyš Khanty the form *ōrńз* 'gold' (KT 874a) is used in folklore texts instead of the usual noun *sōrńз*. Phonologically, *ōrńз* represents the type (2c). Note that types (1c) and (2c) share the loss of the Proto-Ugric initial **s* that is otherwise characteristic of Hungarian.

	Gold	Iron	Copper	Steel	Tin	Lead	Silver
Saami S	$^{\mathrm{S}}$*güllie*	$^{\mathrm{S}}$*ruövdie*	$^{\mathrm{No}}$*guäppere*	$^{\mathrm{No}}$*staalie*	$^{\mathrm{S}}$*didnie*		$^{\mathrm{S}}$*s′ïlbe*
Saami N	$^{\mathrm{S}}$*gol'le*	$^{\mathrm{S}}$*ruow'de*	$^{\mathrm{A}}$*veai'ke*	$^{\mathrm{No}}$*stálli*	$^{\mathrm{S}}$*dâdne*	$^{\mathrm{N}}$*laddjo*	$^{\mathrm{S}}$*sil'bâ*
Saami I	$^{\mathrm{S}}$*kolle*	$^{\mathrm{S}}$*ryev′di*	$^{\mathrm{A}}$*veški*	$^{\mathrm{No}}$*stääli*	$^{\mathrm{S}}$*tane*	$^{\mathrm{N}}$*lajo*	$^{\mathrm{S}}$*silba*
Saami Ki	$^{\mathrm{S}}$*kå′ll*	$^{\mathrm{S}}$*rū′vvd*	$^{\mathrm{A}}$*vie′ššk*	$^{\mathrm{Ru}}$*stā′ll*	$^{\mathrm{S}}$*ta′nn*	$^{\mathrm{Ru}}$*vi̯′nts*	$^{\mathrm{S}}$*si̯llb*
Finnish	$^{\mathrm{G}}$*kulta*	$^{\mathrm{G}}$*rauta*	$^{\mathrm{A}}$*vaski*	*teräs*	$^{\mathrm{S}}$*tina*	$^{\mathrm{Sw}}$*lyijy*	*hopea*
			$^{\mathrm{Sw}}$*kupari*				
Karelian S	$^{\mathrm{G}}$*kulda*	$^{\mathrm{G}}$*rauda*	$^{\mathrm{A}}$*vaski*	*teräz*	$^{\mathrm{S}}$*tina*		*hobie*
Veps C	$^{\mathrm{G}}$*kuld*	$^{\mathrm{G}}$*raud*	$^{\mathrm{A}}$*vaśk*		$^{\mathrm{S}}$*tin*		*hobed*
Estonian	$^{\mathrm{G}}$*kuld*	$^{\mathrm{G}}$*raud*	$^{\mathrm{A}}$*vask*	*teras*	$^{\mathrm{S}}$*tina*	$^{\mathrm{S}}$*seatina*	*hõbe*
Livonian	$^{\mathrm{G}}$*kūlda*	$^{\mathrm{G}}$*rōda*	$^{\mathrm{A}}$*vašk*	$^{\mathrm{G}}$*tierōda*	$^{\mathrm{S}}$*tinā*	$^{\mathrm{La}}$*svinā*	*õbdõ*
Erzya	$^{\mathrm{I}}$*si̯rńe*	$^{\mathrm{I}}$*kšńi*	*piže*	$^{\mathrm{Ru}}$*stal′*	*kive*		$^{\mathrm{I}}$*śija*
Moksha	$^{\mathrm{I}}$*śirńə*	$^{\mathrm{I}}$*kšńi*	$^{\mathrm{I}}$*śerəń* $^{\mathrm{I}}$*śerā̆*	$^{\mathrm{Ru}}$*stal′*	*kivə*		$^{\mathrm{I}}$*śije*
Mari H	$^{\mathrm{I}}$*šörtńö*	$^{\mathrm{I}}$*kürtńö*	$^{\mathrm{B}}$*würγe·ne*	$^{\mathrm{T}}$*wurs*	$^{\mathrm{FU}}$*wulno*	$^{\mathrm{FU}}$*wüδwulno*	$^{\mathrm{I}}$*šij*
Mari M	$^{\mathrm{I}}$*šörtńə̑*	$^{\mathrm{I}}$*kərtńi*	$^{\mathrm{B}}$*wərγeńə*	$^{\mathrm{T}}$*wurs*	$^{\mathrm{FU}}$*wulnə̑*	$^{\mathrm{FU}}$*wəδwulnə̑*	$^{\mathrm{I}}$*ši*
Udmurt	$^{\mathrm{I}}$*zarńi*	$^{\mathrm{I}}$*kort*	$^{\mathrm{B}}$*i̯rgon*	$^{\mathrm{I}}$*andan*	$^{\mathrm{A}}$*uzveś*	$^{\mathrm{A}}$*śe̯d uzveś*	$^{\mathrm{A}}$*azveś*
Komi	$^{\mathrm{I}}$*zarńi*	$^{\mathrm{I}}$*ke̯rt*	$^{\mathrm{B}}$ *i̯rge̯n*	$^{\mathrm{I}}$*jemdon*	$^{\mathrm{A}}$*ozi̯ś*	$^{\mathrm{Ru}}$*svińeć*	$^{\mathrm{A}}$*ezi̯ś*
Mansi N	$^{\mathrm{I}}$*sōrńi*	$^{\mathrm{I}}$*kēr*	$^{\mathrm{B}}$*arγin*	$^{\mathrm{I}}$*ēmtan*	$^{\mathrm{I}}$*ānaχ*	$^{\mathrm{A}}$*ātwəs*	$^{\mathrm{FU}}$*śālγoln*
Mansi Ko	$^{\mathrm{I}}$*sarəń*	$^{\mathrm{I}}$*kēr*	$^{\mathrm{B}}$*ärγən*	*ėȧtėm kēr*		$^{\mathrm{A}}$*ȯȧt₍ws*	$^{\mathrm{FU}}$*ȯȧlen*
			$^{\mathrm{I}}$*tå̄reń*				
Mansi T						*wōlėm*	$^{\mathrm{FU}}$*ålėn*
Khanty Ka	$^{\mathrm{I}}$*sɔ̄rńi*	$^{\mathrm{I}}$*kārti*		$^{\mathrm{I}}$*kārti*		*ētpəŋkārti*	
		$^{\mathrm{A}}$*wŏχ*	$^{\mathrm{A}}$*pătərūχ*	*ētəp*	*ēŋas ʌŏʌpi*	*ʌŏʌpi*	$^{\mathrm{A}}$*śēlwŏχ*
Khanty Ni	$^{\mathrm{I}}$*sɔ̄rńə*	$^{\mathrm{I}}$*kārtə*	$^{\mathrm{A}}$*pətərwŏχ*	*ētəp*	*χăntətŏtpə*	*tŏtpə*	$^{\mathrm{A}}$*šoiteŋwŏχ*
Khanty I	$^{\mathrm{I}}$*sōrńə*	$^{\mathrm{A}}$*wăχ*	$^{\mathrm{A}}$*wərtəwăχ*	$^{\mathrm{A}}$*əntwăχ*	$^{\mathrm{FU}}$*χănt ūtən*	$^{\mathrm{FU}}$*ūtən*	$^{\mathrm{A}}$*jəmwăχ,*
	sōrńəwăχ				*tătpə*	*rūt’ tătpə*	*nǟwə wăχ*
Khanty Su	$^{\mathrm{I}}$*så̄rńi̯*	$^{\mathrm{A}}$*wăγ*	$^{\mathrm{A}}$*kăntəγwăγ*	$^{\mathrm{A}}$*īnʌwăγ*	*kăntəγʌŏʌpə*	*ʌŏʌpə*	$^{\mathrm{A}}$*jəmwăγ*
			ʌŏrńi̯ wăγ				
Khanty V	$^{\mathrm{I}}$*sărńз*	$^{\mathrm{A}}$*wăγ*	$^{\mathrm{A}}$*pūtwăγ*	$^{\mathrm{A}}$*īnlwăγ*	$^{\mathrm{FU}}$*sēr ōlnз*	$^{\mathrm{FU}}$*ōlnз* *ńǟmk ōlnз*	$^{\mathrm{A}}$*jĕmwăγ,* *nǟγi wăγ*
			$^{\mathrm{I}}$*lōrńз,* *lōrńəwăγ*				*sărńəwăγ*
Khanty Vj	$^{\mathrm{I}}$*sărńi̯*	$^{\mathrm{A}}$*wăχ*	$^{\mathrm{I}}$*jōrńi,*	$^{\mathrm{A}}$*īnlwăχ*	$^{\mathrm{FU}}$*nǟγōlna*	$^{\mathrm{FU}}$*ōlna*	$^{\mathrm{A}}$*nǟγi wăχ*
	wĕrtə *sărńi̯*		*jōrńiwăγ*				*nǟγi sărńi̯*
Hungarian	$^{\mathrm{I}}$*arany*	$^{\mathrm{A}}$*vas*	$^{\mathrm{D}}$*réz*	*acél*	$^{\mathrm{FU}}$*ón*	$^{\mathrm{FU}}$*ólom*	$^{\mathrm{I}}$*ezüst*

Table 1. Metal names in the Finno-Ugric languages. Raised prefix letters indicate the proposed origin of metal name stems in published sources: $^{\mathrm{G}}$ Germanic, $^{\mathrm{S}}$ Scandinavian, $^{\mathrm{Sw}}$ Swedish, $^{\mathrm{No}}$ Norwegian; $^{\mathrm{I}}$ Iranian; $^{\mathrm{B}}$ Baltic or Iranian; $^{\mathrm{La}}$ Latvian, $^{\mathrm{R}}$ Russian; $^{\mathrm{A}}$ Armenian or Tocharian; $^{\mathrm{T}}$ Turkic; $^{\mathrm{D}}$ Dagestan; $^{\mathrm{FU}}$ Finno-Ugric. Local Finnic, Mordvinic, Mansi, Khanty, or Hungarian names are unmarked.

3. Names of iron

3.1. The proposed etymologies for Finnic **rauta* ‘iron’ are usually either the Proto-Germanic **rauđa-* (cf. SKES 751a) or **rauđan-* (cf. Tette Hofstra 1985: 91 and SSA sub *rauta*). Both reconstructions are based on the Old Norse masculine noun *rauđi* ‘marsh ore’ whose meaning is most intimately connected with iron. The noun *rauđi* is etymologically related with the Old Norse adjective *rauđr* ‘red’ and feminine noun *rauđa* ’red color; blood; yolk’ (for Old Norse words, cf. de Vries 1962: 434–435). If we want to reconstruct a phonetically and semantically suitable Germanic origin for the Finnic stem, it should be the accusative case form *rauđa* of the word *rauđi*.

For the sake of comparison, Vladimir Terent’ev (1990: 31–32) proposed the Finnic stem **rauta* to be “a Krivich loanword where Slav. *au* had not undergone a change to *u*”. Actually, all we know about the language of the Kriviches, the predecessors of the Byelorussians, are certain local variants in so-called Old Russian documents written by Byelorussian scribes. Note that the Old Russian orthography followed the Old Church Slavonic tradition of writing the vowel *u* as *oy*. The Old Church Slavonic (and Armenian) tradition of writing *u* with two letters (this sequence of two characters was considered one letter) followed the example of Greek where the sequence *ου* was pronounced as a diphthong in Ancient Greek but as [*u*] afterwards. In Slavic, the diphthong *ou* is partially retained only in Czech and in Polabian, an extinct West Slavic language spoken in the Elbe (Łaba) River tributary. However, even Czech has the monophthong *u* in this set of stems, cf. *ruda* ‘ore’ and *rudy* ‘red’. Thus the proposed Slavic stem had undergone the change **ou* > *u* at a very early stage. Hence the Finnic stem **rauta* is not a Slavic loanword.

3.2. According to both editions of the Finnish etymological dictionaries SKES and SSA (s.v. *rauta*), the Saamic names for iron are borrowed from Finnish.

3.3. Words denoting ‘iron’ in Mordvinic, Mari, Permic, Mansi, and the northernmost Khanty dialects are considered Iranian loanwords borrowed from different sources in different times (Joki 1973: 273) and they clearly fall into four subtypes (cf. Table 1, above): (a) disyllabic words ending in *ńV* (Mordvinic, Mari), (b) disyllabic words ending in *i* or *ə* (Khanty), (c) monosyllabic words ending in *rt* (Permic), (d) monosyllabic words ending in *r* (Mansi). In the Mordvinic word denoting ‘iron’ the former vowel of the initial syllable was lost; occurrence of *š* instead of *rt* makes the stem special among the related stems. The component *ńV* in Mordvinic *kšńi* and Mari *kürtńö*, *kərtńi* may have arisen on the analogy of the words denoting gold. In Mari, the four metal names end in a component *ńV* or *nV* and the vowel *V* follows vowel harmony rules and varies mostly depending on the vowel of the preceding syllable.

The vowel *i* in the Khanty words has certain parallels in Iranian, cf. Avestan *karəti* ‘knife’; the vowel *i* or its non-syllabic variant has caused the change of *t* or *d* to *č*, *š*, or *ž* in certain Iranian and Indo-Aryan languages, such as Shugni *kârč* ‘steel’ and Baluchi *kārč*, Wakhi *kə̄ẓ̌*. Probably the Mordvinic stem *kšńi* was also borrowed from a source language that had undergone that change. The cluster *rt* is known from Avestan, Sanskrit, Sogdian, and Yaghnobi, whereas most Iranian languages have *rd* instead. Thus, it is possible that *d* is an innovation. Some Iranian languages have dropped the stop from the cluster, e.g. Kurdish *kêr*. Probably the frontness of the vowel in the initial syllable of the Finno-Ugric iron names results from the fact that the vowel *a* attested in several Iranian languages is perceived more as a front vowel by speakers of a language where there is a contrast of *a* and *ä*. Vowel length in Khanty words obviously reflects that in the source language. In most Iranian languages the stem has the meaning ‘knife’, so e.g. for Ossetic *kard*, Persian *kārd*, Tajik *kord*. It is possible that the semantic shift ‘knife’ > ‘iron’ took place in Finno-Ugric languages when the first iron knives and their names were received from Iranian people. On the other hand, the Hungarian word *kard* ‘sword’ still refers to a special subtype of knives.

3.4. In most Khanty dialects ‘iron’ is called *wăχ* ~ *wăγ*, whereas in Hungarian it is *vas*. The history of the Khanty variant is problematic because of the unexplainable spirant *χ* ~ *γ*. In dictionaries, the Khanty stem is presented also as having the meaning ‘metal’. Still it is not clear whether the meaning ‘metal’ was an extension of the original meaning by native speakers or a scientific generalization obtained after seeing the names of the four metals discussed in this article. The native Khanty classification of the subclasses of iron includes alongside (a) steel (*əntwăχ* = *īnʌwăγ* ‘blade iron’) also (b) copper (*pătərūχ* ~ *pətərwŏχ* ‘story iron’ or *pūtwăγ* ‘pot iron’ or *wərtəwăχ* ‘red iron’ or *kăntəγwăγ* ‘Khanty iron’), (c) silver (*śēl wŏχ* ‘melt iron’ or *šoiteŋwŏx* ‘heavy iron’ or *jəmwăγ* ‘good iron’or *nā̆wə wăχ* ~ *nā̆γi wăγ* ‘white iron’), and in Surgut, Vasjugan, and Vah also (d) gold (*sā̊rńi̯ wăγ* ‘gold iron’). Still in Khanty the semantic space of ‘iron’ does not include tin or lead. Hence, *wăχ* ~ *wăγ* is not a general term for metals but instead the name for one of the three traditional metals alongside gold and lead.

4. Names of steel

Steel was first created as an alloy of iron and carbon in the process of smithing tools or weapons with a sharp edge or blade. The words denoting ‘steel’ are listed in the fourth column from the left in Table 1 above.

4.1. In Finnic, words denoting ‘steel’ directly hint at the blade. Livonian *tierōda* is a shortened form of the former compound *tierā/rōda* ‘blade iron’ In other languages, derivatives of the stem **terä* ‘blade’ are found.

4.2. The obvious similarity of steel names in Saamic and Mordvinic results from the fact that the name for steel in Russian is a borrowing from Germanic. Here on the basis of the occurrence of palatalized lateral *l′*, the Kildin Saami and Mordvinic names are considered borrowings from Russian, while North and Inari Saami words are considered borrowings from Norwegian. The criterion is somewhat vague, as the front vowel *ää* in Inari Saami comes from earlier **ā* under the influence of the front vowel of the following syllable that probably, temporarily, caused also palatalization of the preceding *l*.

4.3. According to Gordeev. the Mari word for ‘steel’, *wurs*, Malmyž *wurŭs*, in the 18th century *urs*, is likely borrowed from Old Chuvash, cf. Chuvash *χurśă*, *χurăś* ‘steel’ (Gordeev 1983: 173). However, this assumption is erroneous, because Chuvash word-initial *χ*- should be reflected as *χ* in Hill Mari and loss (Ø) in Meadow Mari (Räsänen 1920: 21–22), while Mari *w*- corresponds to Chuvash *v*- (op. cit. 54–60).

4.4. Steel names in Permic and North Mansi are usually considered Iranian borrowings (Joki 1973: 249–250). Still, among Iranian languages, the stem occurs only in Ossetic, cf. *ændon* ‘steel’, and in some Scythian proper names. On the other hand, Abaev (1958: 156–157) brings comparisons from languages of three North Caucasian groups, cf. Ubykh *andān* ‘chisel; sharp’, Ingush *ondæ*, and Dargin *šandan* ‘steel’.

4.5. Kazym and Nizam Khanty words denoting ‘steel’, *ǟtəp* and *ētəp*, are derived from the verb stem *āttə*- < Proto-Khanty **ǟt*- ‘to temper’ (Honti 1982: 130, number 70).

5. Names of copper

5.1. Saamic copper names go back to Proto-Saamic **vǟškē* (< **väśkä*) (according to Lehtiranta 1989: **vε̄škē*), and Finnic words go back to **vaski* : **vaske* < **vaske*. Problems connected with their background will be discussed in section 6.

5.2. The Erzya name for copper *piže* is based on the semantic extension of the identical color name *piže* ‘green’.

5.3. Moksha copper names *śerəń* and *śerä* are connected with the Moksha gold name of Iranian origin, cf. section 2.2.

5.4. For Mari *würγenə*, Udmurt *i̯rgon*, Komi *i̯rgen̮*, Mansi *arγin*, different East-Iranian and Baltic sources have been proposed: (a) Sogdian *uγrani* ‘blood’ (cf. Joki 1962: 150–153; KÈSKJa 329); (b) Alanian, cf. Ossetic *ärχuə* ’copper’ (Trautmann 1910: 458); (c) Baltic, cf. Old Prussian *wargien* ’copper’, Lithuanian *vãrias*, *vãris*, Latvian *varš* (Gordeev 1973: 98–100, 1983: 196).

As the Sogdian script, derived from the Aramaic script, was written with consonant letters, the proposed reading *uγrani* of the Sogdian stem written *wγrn-* is problematic. The existence of another Sogdian stem *γwrn-* with the same meaning suggests that one of the stems may be misspelled. In any case, the order of consonants in the proposed donor language differs too much from that in Mari, Permic, and Mansi.

The proposed Alanian origin of the words denoting ‘copper’ is based on the evidence from Ossetic, the last surviving Northwest Iranian or Scythian language. Ossetic shares several metal names with Finno-Ugric. According to Abaev (1958: 186), the Ossetic word for copper *ärχuə* is of unclear origin. The Ossetic stem has no *n*, so probably Ossetic was not the actual donor. Due to the low first syllable vowel quality, the Konda Mansi stem is the closest to that in Ossetic. Moreover, according to Abaev, the variant *ærχi* occurs in Ossetic as well. In Permic, there are many cases where a former vowel **a* has changed to a high back vowel in inherited Finno-Ugric vocabulary. For Mari such a change is unusual, so probably the Mari word was borrowed from Udmurt, and later its first syllable became associated with the Mari word for blood (Meadow Mari *wür*, Hill Mari *wər*).

Obviously in order to explain the initial *w* in Mari copper names, Fedor Gordeev (1973: 98–100, 1983: 196) has proposed a common protoform **vargene* for the Mari, Permic, and Mansi words and further suggested that it would have been a borrowing from Baltic. cf. Old Prussian *wargien* ‘copper’, Lithuanian *vãrias*, Latvian *varš*. Vjačeslav Ivanov (1983: 105) connects the Baltic words with Indo-European verbs such as Latvian *vārīt* ’to boil’ and Hittite *u̯ar* ’to burn’ (cf. also Karulis 1992: 491). Gordeev’s etymology is incorrect due to phonological reasons, as (a) there was no reason to drop the initial consonant *v-* in Permic and Mansi and (b) there was no etymological *g* in the Old Prussian copper name (the word *wargien* should be read as [*varjen*], similarly to reading of sequences with *ge* in Baltic German).

5.5. Konda Mansi *tā̊reń*, Vah Khanty *lōŕńз*, and Vasjugan *jōŕńi* come from the Iranian stem for gold, cf. section 2.2.

5.6. Bernát Munkácsi proposed that Hungarian *réz* descends from Avar *rez* ‘red copper’ (MNyTESz 405). According to Said Hajdakov (1973: 76) the Avar *rez* is not ‘copper’ but ‘brass’ similarly to the related stems in other Dagestan languages, cf. Andi *jez* ‘brass’, Bezhta *iez* ‘yellow copper’ (i.e. ‘brass’ or ‘chalcopyrite’), Dargin *jaz* ‘brass’, Tsakhur *jez* ‘brass’. In these Dagestan Northeast Caucasian words, the initial consonants together with the following vowel represent petrified word class prefixes. The Avar noun *rez* is unique among the related Dagestan nouns in containing a prefix beginning with *r* and may thus be secondary. On the other hand, the nouns beginning with *j* may well be related with the similar Turkic stem *jez* ‘yellow copper’ that was attested already in Old Turkic and occurs also in Kumyk, spoken in northwestern Dagestan.

Hartmut Katz (2003: 258–259) postulates a front vocalic source **räu̯ dʰɔḥm* in Early Proto-Aryan as the origin of the Hungarian word. In Aryan, there are also words in which a back vowel occurs, such as Sanskrit *lohá* ‘reddish; reddish metal, copper’, New Persian *rōd* copper’, and front vocalic Greek and German verbs, cf. German *röten* ‘to redden’.

Both explanations are highly hypothetical.

6. The background of Finnic **vaski*/**vaske*- and Saamic **vāškē* ‘copper’

Saamic **vāškē* and Finnic **vaski* ~ **vaske*- are considered etymological cognates with Erzya *uśke* and Moksha *uśkä* ‘wire’ from Proto-Mordvinic **uśkз*, and are found in several other stems not used as copper names, cf. Hill Mari *waž* and Meadow Mari *wož* ‘ore’ (in compounds), Udmurt *veś* and Komi *i̯ś* in words for tin (and lead) and silver, Tavda Mansi *küš*, West Mansi *weš*, North and Konda Mansi *wes* in compounds for lead, Khanty *waγ* and *waχ* ’iron; metal; money’, Hungarian *vas* ‘iron’, Tundra Nenets *jeśe*, Forest Nenets *ẃeśe* ’iron; money’; Enets *bese* ‘iron’, Nganasan *bása* ’iron; metal’, Kamas *basa, wasa* ‘iron’, Turukhansk Selkup *kęzǟ*, Taz, Tym, and Ket Selkup *kwęzi̯* ‘iron’, Motor *baze* ‘iron’.

6.1. The etymological dictionary of the Uralic languages (UEW 560) gives the words listed above a Uralic protoform **waśke*, in which the stem vowel **e* is reconstructed on the basis of Finnic. Juha Janhunen (1981: 225) has proposed for both Proto-Finno-Permic and Proto-Uralic the front vocalic stem **wäśkä* with the stem vowel **ä* based on the evidence of Saamic and Samoyedic. The sibilant **ś* is evidenced by Permic, North, and Konda Mansi, Hungarian, and Samoyedic data.

The words attested in the Uralic languages have been regarded as borrowings from different Indo-European sources: (a) from Armenian *oski*[3] ‘gold’ (first suggested by Adolphe Pictet in 1859 (SSA 3: 416)) and (b) from Proto-Tocharian (first suggested by G. S. Lane in 1970 (Joki 1973: 340); Lane also admitted the possibility of borrowing in the opposite direction), cf. Tocharian A *wäs* ’gold’ and Tocharian B *yaza* ’gold’.

6.1.1. The Armenian word denoting ‘gold’ *voski* cannot be the source of the Uralic stem set because Indo-European predecessors of Armenians moved to Armenia only in the 7th century from Asia Minor. According to Vjačeslav Ivanov (1983: 105), the Armenian stem is borrowed, possibly from Urartian, cf. *ušḫu* ‘silver’ in the related Hurrian. Ivanov’s assumption is based on Émile Benveniste’s hypothesis on the Hurrian origin of the name of the vessel for producing pure gold in Greek, cf. Greek *ὄβρυζα* and Hurrian *ḫuprušḫi*. The Hurrians are believed to have entered northern Mesopotamia from the Armenian Highlands in around

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[3] At least in modern Armenian the word is pronounced [*voski·*].

2500 BC. Although silver and gold are different enough, it is not clear whether the Armenian and Hurrian words are related to the Sumerian word *guškin* ‘gold’ mentioned in Joki (1973: 340).

6.1.2. The idea of the possible Tocharian origin of the Proto-Samoyedic stem **wesä* was reconciled by Juha Janhunen (1983: 120–121) for whom “it remained to be solved, whether the Finno-Ugric metal names with an internal *-*k*- could also derive from a Tocharian source”.

The Saamic, Finnic, and Mordvinic stems with *k*- as such cannot originate from Tocharian A *wäs* ‘gold’ and Tocharian B *yaza* ‘gold’ or Proto-Tocharian **wäsa*. The Tocharian hypothesis was criticized by Petri Kallio (2004: 132–133) and Paul Widmer (2002: 172–174). Vladimir Napol’skikh (2001: 374) accepts it only for Samoyedic **wesä*.

6.1.3. According to Hartmut Katz (2003: 255) the names, except Mari *waž*, go back to Proto-Uralic **wȩ̄́škä* ‘copper’ and **wə̂š́kä́* whence Finno-Permic **wăš́ká* and Proto-Samoyedic **wȩ̄š́ä* **wȩ̄š́kä* are considered as nominalized present tense participles of the verb stem **wȩ̄š́з* ‘to shine yellow or red’. As the verb stem **wȩ̄š́з* is reconstructed on the basis of two Mansi derived verbs and one possible Khanty participle for which no cognates from other Finno-Ugric languages are found, it is a weak argument for the Uralic origin of the name for copper. Moreover, in order to derive the supposed Proto-Permic stem from the Proto-Uralic form, ad hoc sound changes must be postulated both for the vowel of the first syllable and for the following sibilant. Therefore the etymology proposed by Katz cannot be accepted.

6.1.4. Katz (2003: 256) proposed a common protoform with subsequent changes *h_2*éi̯Hos* > *h_2*ái̯Hos* > Early Proto-Aryan *h_2*ái̯ɔs* > **wā́jas* for a set of Indo-European copper names, such as Sanskrit *áyas*-, Avestan *aiiah*-, Latin *aes*, Gothic *ais* (Pokorny 1959: 15–16) and a set of iron names[4] (e.g. Old Irish *íarn*, Gallian *Isarno*-, cf. Pokorny 1959: 300) and postulated the oblique form *wā́i̯sə* derived from **wā́jas* as the etymological origin of the Mari protoform **wåž* of Hill Mari *waž* and Meadow Mari *wož.* The proposed chain, however, does not explain why the Proto-Indo-European *a*-colored laryngeal *h_2 changed to **w* in Aryan or Iranian.

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[4] Although the two stem sets share the sounds *i* and *s* and both denote a metal, it hardly means that the sets are etymologically related.

6.2. Actually, the words under discussion exhibit a set of problematic occurrences:

(1) in Saamic, Finnic, and Mordvinic stems the correspondence of stem vowels (i.e. of final vowels of the 2nd syllable) is irregular;

(2) Words denoting ‘copper’ in Saamic, Finnic, and Mordvinic differ from other Uralic languages because they have a second syllable beginning with a *-k-* that has no corresponding elements in other languages (cf. Table 1, above).

(3) In Khanty, in the semantically corresponding words the spirant *γ* or *χ* occurs instead of a sibilant found in other languages.

6.2.1. As an explanation of the second syllable beginning with *k* in Saamic, Finnic, and Mari metal names, occurrence of the derivational suffix **ka* was proposed in Carpelan & Parpola (2001: 127). This proposal must be questioned because of the irregularity of stem vowels attested in contemporary languages. Moreover, it has not been demonstrated why a suffix would occur in the given stem.

6.2.2. On the northwestern coast of Lake Onega in Karelia, in the Volga-Kama region, and in the Urals, copper was smelted from certain minerals approximately in 3000 BP. Obviously somewhere in this region the copper names with the segment *-kV* were once created. Hence we must ask what the segment *-kV* denotes in the Finnic and Saamic copper names. The Finnic reconstruction **vaski* : **vaske-* < **vaśke(-)* ‘copper’ is reminiscent of the Estonian word for ‘mill’, namely Estonian *veski* (dial. *veske*), which is etymologically a shortened form of the former compound word for ‘water mill’ **vesikivi* ‘water + stone’, cf. also Erzya *veďgev* ‘mill’ from **veď* + *kev* ‘water + stone’. So it is conceivable to suppose that also **vaski* is a former compound whose second component was the noun **kivi* : **kive*, copper was received from a mineral, a stone. In all likelihood, all metals were first classified as stones.

As the Finno-Ugric word **kive* is lacking from all Saamic languages, the Saamic stem is probably a Finnic borrowing. When looking for Finnic candidates for the first component of the compound, just two nouns beginning in *vas-* are of interest, namely *vasama* ‘arrow (with blunt arrowhead); thunderbolt’ (cf. SSA 3: 415), and *vasara* ‘hammer; ax’ with equivalents in Saamic (**vă̄ččir*, cf. North Saami *vœčir*) and Mordvinic (Erzya *uźeŕ*, Moksha *uźəŕ*) that show that the earlier stem was **vaśara*. The word itself is an Aryan borrowing, cf. e.g. Avestan *vazra-* ‘club; pestle’, Sanskrit *vajraḥ* ‘thunderbolt’ (UEW 815–816; SSA 3: 415). Note that although *vasara* is a borrowing and the word *vasama* may be a borrowing, their components *ma* and *ra* in the 3rd syllable were and still are perceived as suffixal, and *vasa-* < **vaśa* is intuitively extracted as a stem. So it is possible that both a mineral containing copper and attracting lightning, and the metallic product of the mineral as a material for making more effective weapons and tools, e.g. hammers and axes could be called **vaśakive* ‘*vaśa*-stone’, which later was shortened to **vaśki* and **vaśke-*. This stem that is not attested as an independent word any longer is identical with the Indo-European stem **vaśa*, reconstructed by Asko Parpola (Carpelan & Parpola 2001: 127):

> If Proto-Uralic **wäśkä* 'metal' ends in a Uralic suffix **ka/kä*, Proto-Aryan and Old Indo-Aryan *vā́śī* 'bronze axe or adze' (as a *vṛddhi* derivative from **vaśa* '*bronze') might be related to it.

What remains problematic is the original meaning of the Indo-European stem. The data presented by Alexander Lubotzky (2001: 312) contain no hint to bronze:

> **u̯aćī*-f. 'axe, pointed knife': Skt. *vā́śī* f. 'axe, adze, chisel'; LAv. (Yasna 42.4) *vāsī* 'pointed knife (?)', Oss. *wæs* (better *was* ?) 'axe, wood-chopper'.

It must be assumed that axes, adzes, and chisels are older than bronze and have preserved their former names even when made of bronze. Moreover it is improbable that names for 'thunderbolt', such as Sanskrit *vajraḥ* and Finnic **vasama* were derived from a metal name.

Alongside the Indo-Aryan stem there exists a somewhat similar and simpler metal name in Circassian (Northwest Caucasian) languages. In the Circassian languages, certain metal names are composed by means of the stem *γ*^{w}*a* ~ *γ*^{w}*e* ~ *γ*^{w}*ə*, which may be related with *γ*^{w}*e* 'yellow, red'. In the extinct Ubykh, spoken first on the northeastern coast of the Black Sea, and last in Turkey after the Russian invasion, there are several metal names such as *wəs*^{w}*e* 'copper' and *wəç̣*^{w}*e* 'iron' in which the former *γ*^{w} was changed to *w*, cf. also *s*^{w}*e* 'bright' and *ç̣*^{w}*e* 'grey' (Šagirov 1977: 131–132). In other Circassian languages the initial consonant *γ*^{w} is retained and the attributive component of word for copper is *pl'ə* 'red'). So, it can be asked whether the Aryan and Northwest Caucasian stems are related.

The borrowed protoform **vaśa* in the Uralic languages allows us to explain all later stem variants with front vowels as resulting from the assimilative influence of the palatalized sibilant **ś* and all stem variants with the sibilant *š* or *ž* as developments of **ś*. The occurrence of the spirant *χ* or *γ* in Khanty names can be explained by alleging that the metal name was borrowed either from an Iranian dialect where the sibilant had undergone the Iranian local change **ś* > **h* in 1000–1500 BC or from a Dagestan language, cf. Avar *baχ* ~ *paχ* 'copper', Chamalal, Hunzib *baχ* 'copper', Bezhta *bak* 'copper'.

7. Changes in the semantic system of words denoting ‘copper’, ‘gold’, and ‘iron’

The somewhat irregular system of related stems in names of different metals in Finno-Ugric languages gets an explanation if we suppose that the relationship between different meanings was reorganized and semantic shifts took place between the metal names.

The rise of an unknown metal name or a semantic shift in a given language can be defined as a new (micro)stage in the history of a language. Assuming that copper was the first metal that the early Finno-Ugrians came to know, and the two layers of words denoting ‘gold’ discussed in section 2 are correct, there are altogether 10 stages in the history of ‘copper’, ‘gold’ and ‘iron’ that can be singled out as follows: Copper 1, Copper 2, Copper 3; Gold 1, Gold 2; Iron 1; Wire / Ore / Metal.

It was found that the 10 stages form 19 ordered pairs of the possible 45 pairs are strictly ordered, namely: {Copper 1, Copper 2}, {Copper 1, Copper 3}, {Copper 1, Iron 1}, {Copper 1, Iron 2}, {Copper 1, Wire}, {Copper 1, Ore}, {Copper 1, Metal}; {Copper 2, Copper 3}; {Copper 3, Gold 2}; {Gold 1, Copper 3}, {Gold 1, Gold 2}; {Iron 1, Copper 2}, {Iron 1, Iron 2}; {Wire, Copper 2}, {Wire, Copper 3}; {Ore, Copper 2}, {Ore, Copper 3}; {Metal, Copper 2}, and {Metal, Copper 3}. The stages Iron 1, Wire, Ore, and Metal are complementary. For the sake of comparability as to Iron 2, Iron 1 is presented in a column of its own; Wire, Ore, and Metal are presented together in a single column. As the number of strictly ordered pairs of stages is modest, it is possible to build several formally correct tables. Table 2 is one such table. It must be noted that Copper 1 and Gold 1 are not strictly ordered. Hence words for copper cannot be proven to be older than gold names, and vice versa. Copper 2, which reflects copper names as a subclass of iron, cf. section 3.4, is partially a stage of indefinite length and even intersects the Copper 3 stage in Vasjugan where the compound *pūtwaγ* ‘pot iron’ probably occurs later than the word *lōrńз* ‘copper’.

	Copper 1	Iron 1	Wire / Ore / Metal	Copper 2	Iron 2	Gold 1	Copper 3	Gold 2
Saamic	① *vā̈śkä	*rōvte				*kollē		
Finnic	② *vaske-	*rauta				*kulta		
Md	③ *uśka ↗		↘③ *uśka		① kšńi	❶ *serəń ↗	↘❶ śerəń	❶ sirńe
Mari	④ *waž ↗		↘④ waž		② kürtńö		1 würyene	❷ šörtńö
Komi	⑤ -i̯ś ↗		↘⑤ -i̯ś		③ ke̯rt		2 i̯rgon	❸ zarńi
Ud	⑥ -veś ↗		↘⑥ -veś		③ kort		2 i̯rge̯n	❸ zarńi
MnSo	⑥ -wəs ↗		↘⑥ -wəs		④ kēr		3 arγin	❹ sōrńi
MnKo	?				④ kēr	❷ tå̄reń ↗	↘❷ tå̄reń	❺ sarəń
MnP	?				?	❸ tariń ↗	↘❸ tariń	?
KhaKa	⑦ wŏχ ↗	↘⑦ wŏχ		pătərūχ	kārti			❹ sɔ̄rńi
KhaNi	⑦ wŏχ ↗	↘⑦ (wŏχ)		pətərwŏχ	kārtə			❹ sōrńə
KhaI	⑦ wăχ ↗	↘⑦ wăχ		wərtəwăχ				?
KhaSu	⑦ wăγ ↗	↘⑦ wăγ		kăntəγwăγ		❹ ʌŏrńi̯ ↗	↘❹ ʌŏrńə-	❹ så̄rńi̯
KhaV	⑦ wăγ ↗	↘⑦ wăγ		pūtwăγ		❹ lōrńз ↗	↘❹ lōrńз	❹ sărńз
KhaVj	⑦ wăχ ↗	↘⑦ wăχ				❹ jōrńi ↗	↘❹ jōrńi	?
Hu	⑧ vas ↗	↘⑧ vas				❺ arany	réz	

Table 2. The mutual relationship between metal names in Finno-Ugric languages.

Abbreviations

KhaI	Irtyš Khanty	Md	Mordvin
KhaKa	Kazym Khanty	MnKo	Konda Mansi
KhaNi	Nizjam Khanty	MnP	Pelym Mansi
KhaSu	Surgut Khanty	MnSo	Sos'va Mansi
KhaV	Vah Khanty	Oss.	Ossetic
KhaVj	Vasjugan Khanty	Skt.	Sanskrit
Hu	Hungarian	Ud	Udmurt
LAv.	Late Avestan		

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Phonological Innovations of the Southern Finnic Languages[1]

This paper gives an overview of the phonological innovations in the Southern Finnic languages, which have caused these languages to be considerably different from other Finnic languages. The focus is on sound changes which are generally characteristic of Southern Finnic languages, i.e. Estonian, including South Estonian, Livonian and Votic, or at least two of these languages. The most important prosodic changes, as well as sound changes of vowels and consonants will be highlighted. The following aspects will be treated: the development of quantitative grade alternation and foot isochrony, tonal distinctions, sound losses and stress shifts, palatalisation of consonants, the history of affricates and /h/, word-initial and syllable-initial consonant clusters, the emergence of high and high-mid unrounded central vowels, and velar vowel harmony, restrictions in the vowel system of non-initial syllables. The following treatment will also take into account data from experimental phonetic studies. Finally, conclusions will be drawn with a view towards the broader historic and areal background.

1. Defining the southern group of Finnic languages

Most studies on the early history of the Finnic languages regard differences between northern and southern Finnic languages as one of the oldest in the language group (see Laanest 1972: 16–18; Itkonen 1983, Salminen 1998, Kallio 2007, Viitso 2008). The ancient differences of these languages are apparent in their sound system, grammar, and vocabulary (see Lehtinen 2007: 157–159). At the same time there has been no consensus about which languages and dialects belong to the southern branch of the Finnic languages, and what the exact historic nature of this language group is, i.e. is it comprised of the descendants of one proto-language or have neighbouring languages become similar as a result

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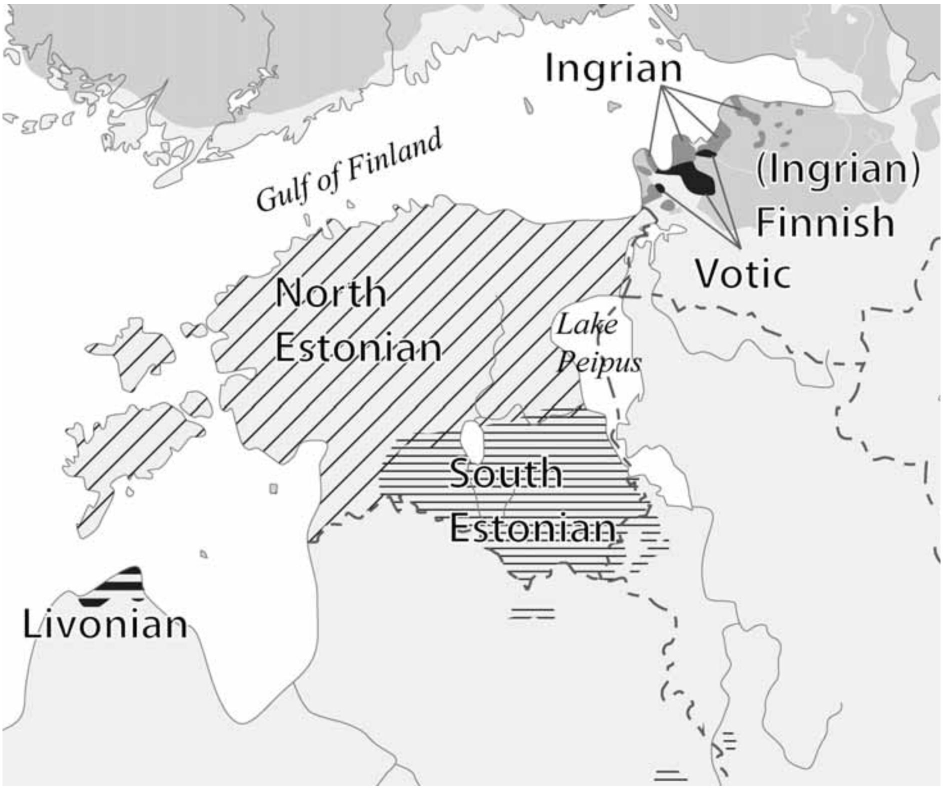
[1] The preparation of this paper was supported by projects no. 8049, SF0180076s08 and IUT02-37 of Estonian Science Council. I am grateful to Riho Grünthal and Tiit-Rein Viitso for their valuable comments and Eva Liina Asu for language assistance.

A Linguistic Map of Prehistoric Northern Europe.
Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 201–224.



Map 1. The geographical distribution of southern Finnic languages.

of secondary contacts between related languages which separated very early (cf. e.g. Itkonen 1983 and Kallio 2007).

Traditionally, Estonian and Livonian are considered to be the core of the Southern Finnic language group, and normally also Votic is included in this group (see Itkonen 1983, Lehtinen 2007). However, it is often emphasised that Votic is historically closely related with northern Estonian (e.g. Ariste 1956, Alvre 1973). In some instances, southwestern varieties of Finnish have been linked to this language group on the basis of their similar sound changes (see Sammallahti 1977). Likewise, similarities between Ingrian and Southern Finnic languages have been postulated, but these common traits should be treated as secondary influences of the southern group (Laanest 1972). At the same time several questions arise at the level of dialects. It is justified to view Estonian as two separate forms – North and South Estonian, which diachronically should be regarded as independent Southern Finnic languages, where South Estonian traits are particularly old (Sammallahti 1977, Viitso 1985, Kallio 2007). The third Estonian dialect group – northeastern coastal dialects – has several traits that are not characteristic of Southern Finnic; these have been explained by the different origin of these varieties (Viitso 1985), archaic features, or the influence of late Finnish and other language contacts (Suhonen 1979; Salminen 1998: 396). The relation between the Estonian northeastern coastal dialects and neighbouring

Estonian dialects has recently been reconsidered (Must 1987, 1995; Söderman 1996; Pajusalu 1999; Pajusalu et al. 2009).

In Livonian, one can above all distinguish Courland and Salaca Livonian as the main dialects; in the case of Courland Livonian, it is important to consider the difference between western and eastern varieties when drawing any historical conclusions (see Viitso 2008, about Salaca Livonian see Pajusalu 2009). As to Votic, it is vital to separate the Kukkuzi variety from the other dialects of Votic (Posti 1980; Viitso 2008: 64–66).

In the present study, the Southern Finnic language group is taken to be comprised of languages spoken on the south coast of the Gulf of Finland and the adjacent territories: Estonian, Livonian, and Votic.

The Estonian language is divided into two historically distinct forms: North and South Estonian. When in the following there is a general reference to Estonian, only such language traits are considered which are equally typical of both North and South Estonian. If need be, differences between dialects are also taken into account in the Livonian and Votic data. Although the Southern Finnic group has primary and secondary common traits, it is nevertheless an old language area whose synchronically common phonological features are not always diachronically interpretable as common innovations or developments that have emerged as a result of their influence, but may have secondarily spread from one language to another. It is possible that several common traits have emerged as innovations on the border of related languages, as for instance the border dialects between North and South Estonian are regarded as the starting point of common innovations in Estonian (Pajusalu 1997, cf. Rätsep 1989).

2. Prosodic changes

Various developments in word prosody have caused the Southern Finnic languages to be notably different from the Northern Finnic languages, mainly spoken on the northern and eastern side of the Gulf of Finland. This is completely true in the case of Livonian and North and South Estonian, and to a lesser extent for Votic. Estonian and Livonian have aquired the characteristics of a fusional language mostly due to widespread prosodic changes (see Viitso 1990).

2.1. The development of long and overlong phonological length

One of the most important prosodic features of Southern Finnic languages is the phonological distinction between short and long geminates, e.g. Estonian Q2 *sep̆pà* ‘smith.GEN’, Q3 *sep̀pă* ‘smith.PART’, Livonian *sip̆pā* ‘drop.NOM-GEN’, *sip̀pə* ‘drop.PART’. The phonetic distinction between short and long geminates occurred already in late proto-Finnic (see Lehtinen 2007: 148–149). The distinction between short and long geminates appeared on the border of the stressed and unstressed syllable and was dependant on the structure of the unstressed syllable – the geminate was shortened when the syllable was closed. However, the constraint is not valid in modern Estonian and Livonian; short and long geminates appear both before open and closed syllables. In North and South Estonian and in Livonian the separation between short and (over)long geminates became phonologically distinct, and after the erosion of word-final elements, including both word stem vowels and inflectional suffixes, led to an extensive change in the grammatical system. Phonological long and overlong quantities started to distinguish between grammatical forms (see Viitso 1990; Grünthal 2000).

The opposition of short and long geminates did not develop only from primary geminates, but could also have occurred as a late gemination of single stops. The paradigmatic oppositions of South Estonian are particularly telling, as in Q2 *kal̆la* 'fish.PART' (< **kalata*) and in Q3 *kal̀la* 'fish.ILL' (< **kalahen*). In addition to Estonian and Livonian, late short geminates also appeared in Votic, e.g. *sät̆tēᴅ* 'sparks', *mak̆kõa* 'sweet', where the precondition for a short geminate was the late long vowel or diphthong of the second syllable (Kettunen 1930: 21). To be precise, the same precondition is also valid for short geminates in Estonian and Livonian. In Livonian, the vowel following a short geminate is always long (Lehiste et al. 2008: 57). In Estonian, the vowel of the second syllable after short geminates, which is phonetically half-long, should be interpreted as lengthened (see Lehiste, Pajusalu 2010).

Along the same lines, short geminates have also developed late in Ingrian dialects in the contact area of the Southern Finnic language group (Markus 2010). The vowel of the unstressed syllable after the geminate that has become overlong is extra short. Therefore, the emergence of the opposition of short and (over)long geminates in the Southern Finnic languages is connected with the change in the general prosodic characteristics of words, i.e. feet, and occurs in these languages together with a tendency for foot isochrony.

In Estonian and Livonian, the opposition of long and overlong durations has, in addition to geminates, also spread to consonant clusters, e.g. Estonian Q2 *mus̆ta* 'black-GEN' vs. Q3 *mus̀ta* 'black.PART', Livonian *mus̆tā* 'black.NOM-GEN' vs. *mus̀tõ* 'black.PART'. Also, the duration of a consonant cluster correlates with the duration of the vowel in the following syllable: in overlong quantity the unstressed syllable is very short. This, too, refers to the interdependency between length alternations of consonants and the general structure of the foot.

Quantity opposition in Estonian and Livonian is not only linked to consonants but also vowels, and is characteristic of the word prosody of these languages in general. Mikko Korhonen has explained the development of the opposition of long and overlong durations in Estonian vowels by the same conditions as the emergence of short and long geminates: the long vowel of the second quantity developed in front of a closed syllable, e.g. Estonian *hōne* 'building.NOM' (< **hōneh*), and the overlong vowel of the third quantity in front of an open syllable, e.g. *hône* 'building.GEN' (< **hōnehen*) (Korhonen 1996 [1969]: 131). Apparently, the preconditions for the paradigmatic alternation of long and overlong came about already during the period of emergence of the Southern Finnic language group, although more exact conditions of occurrence were formed separately in the related languages, and there were certain influences from language contacts with Baltic and

Germanic languages (these contacts were considerably newer than those which have taken place between Germanic and Proto-Finnic, as claimed by Posti 1953, see also Kallio 2000).

In South Estonian, a quality difference has developed in long and overlong mid-high monophthongs: overlong monophthongs have become raised, e.g. EstS Q3 *vyyra* [*vȋ̯ra*] 'strange.GEN', whereas long monophthongs have remained mid-high: Q2 ***võõras*** [*vē̯ras*] 'strange.NOM' (Teras 2003). Both long and overlong vowels have undergone diphthongisation in the southermost South Estonian. Thus, for instance, in Latvia in the Leivu enclave, high vowels have diphthongized in the third quantity: *ii* > *ei, uu* > *ou, üü* > *öü*, e.g. *leìna* 'town. ILL', *soùri* 'big.PL.ILL', but mid-high vowels in the second quantity: *ee* > *ie, oo* > *uo, öö* > *üö*, e.g. *kiĕle* 'language/tongue.GEN', *kuŏli* 'school.GEN' (cf. Viitso 2009). In this way, the difference between long and overlong durations has caused numerous changes in grammatical forms.

In Estonian and Livonian, durational oppositions have besides monophthongs also developed in primary diphthongs, but there are differences between the two languages in the durational ratios of the vowels that make up a diphthong, e.g. Estonian Q2 *heĭna* 'hay.GEN' : Q3 *heìna* 'hay.PART', Livonian *āina* 'hey.NOM-GEN' : *aìnõ* 'hay.PART'. In Estonian, feet with a long vowel and a diphthong in the first syllable are similar to the feet containing geminates: if the vowel in the first syllable is long, the vowel of the following unstressed syllable is half-long, but if the vowel of the first syllable is overlong, the vowel of the following unstressed syllable is extra-short. The extent of the duration difference of the vowel in an unstressed syllable is demonstrated by the fact that Finnish mother-tongue speakers distinguish Estonian words with long and overlong duration judging by the duration of the vowel in the unstressed syllable (Pajusalu 1994, Lippus et al. 2009).

In Livonian, the difference is above all between short and long diphthongs, and, in addition to diphthongs, triphthongs occur. In Livonian words without stød, the differences between the duration of long monophthongs and diphthongs in the first syllable are not as clear-cut; the more important distinction is in the duration of the second syllable vowel (see Lehiste et al. 2008; Tuisk & Teras 2009). In Votic, there is no phonological opposition of long and overlong monophthongs and diphthongs, except in the variety spoken by the Krevinian Votes deported to Latvia, where there were traces of broken tone (see Winkler 1997), presumably as a result of the Latvian influence.

2.2. Tonal distinction in Estonian and Livonian

In Estonian, the primary feature of the quantity opposition is the duration ratio of the first and second syllable, and additionally, in words with a long voiced nucleus in the first syllable, there is a difference in the fundamental frequency contour (see Ross, Lehiste 2001: 37–56; Lippus et al. 2011). Livonian, too, exhibits a ternary quantity opposition, although in a somewhat different form (see Lehiste et al. 2008, Tuisk, Teras 2009, Lehiste, Pajusalu 2010). An important additional feature in Livonian is the broken tone or stød, which occurs in the stressed syllable with a long voiced nucleus, influencing the duration of the syllable nucleus (Lehiste et al. 2008: 39–53).

Both in Estonian and Livonian syllables with long monophthongs, and more broadly, with a long voiced nucleus, the tonal distinction has had an important role in the development of phonological opposition. Eberhard Winkler has shown that the broken tone is present in Courland and Salaca Livonian and the variety spoken by Krevinian Votes (Winkler 2008). Pire Teras has recently presented evidence about the occurrence of broken tone and glottal stop in the linguistic enclave of Leivu (Teras 2010). According to Winkler the appearance of the broken tone in the southernmost Finnic varieties is due to influence as a result of contact with the Baltic languages (Winkler 2000, 2010). Tiit-Rein Viitso has, however, pointed out that the Livonian broken tone has specific traits that do not coincide exactly with the conditions of the occurrence of the broken tone in Latvian (Viitso 2008).

Estonian does not have the Livonian kind of broken tone, but there is a difference in the realisation of the fundamental frequency contour in syllables with a long and overlong nucleus. In the long or second quantity, the fundamental frequency contour on the stressed vowel is relatively level, but in the overlong or third quantity, the fundamental frequency contour can be divided into three parts: a high beginning followed by a fall and a low ending. If these parts are of more or less equal duration and the difference between the high and low plateau is relatively large, it is easy for an Estonian mother tongue speaker to perceive the third quantity (Lippus et al. 2011). Recent studies on the quantity perception of Estonians show that the difference in the fundamental frequency contour is a decisive factor for speakers from West and Central Estonia, whereas speakers from East and South Estonia are able to distinguish well between long and overlong quantity degrees on the basis of the duration ratios of the first and second syllable alone (Lippus, Pajusalu 2009). This result suggests that the emergence of tonal distinctions in Estonian have been influenced by language contacts in the West with speakers of Scandinavian languages.

2.3. Foot isochrony

In the preceding analysis of the long and overlong quantity degrees, it emerged that in Estonian and Livonian, the duration of the first syllable has an influence on the duration of the second syllable: the longer the stressed syllable the shorter the following unstressed syllable. The same tendency is indicated in Votic by the occurrence of short geminates that are always followed by a long vowel. In Estonian and Livonian, the development of foot isochrony has been accompanied by the shortening of phonologically long monophthongs and diphthongs in unstressed syllables. Foot isochrony does not appear only in the case of geminates and long vowels of the stressed syllable, but particularly saliently in words with a short stressed syllable: in Livonian feet, an open syllable with a short vowel is always followed by a long one, e.g. *kalā*, and in Estonian, by a syllable with a half-long vowel, e.g. *kalà*. Admittedly, in Estonian dialects, the duration of the second syllable vowel is quite varied in words with a short first vowel, being relatively longest in the West Estonian Insular variety and Southeastern Estonia. In Finnish, the corresponding lengthened second syllable vowel occurs on the one hand in Southwestern varieties, and on the other hand in Eastern and Northern Finland (Wiik 2006, map 101).

Kalevi Wiik (2006) has explained the tendency for foot isochrony in Finnic languages with the influence of Germanic languages. Foot isochrony as a general prosodic characteristic of words occurs most regularly in the Southern Finnic group of languages, where it could have appeared due to earlier more specific language contacts, on the one hand, and due to language-internal complex prosodic changes, which are also connected with the development of quantity opposition, on the other hand.

2.4. Specific developments of qualitative grade alternation

Qualitative grade alternation varies in all Southern Finnic languages. According to Lauri Posti (1953) an important factor in the development of Finnic grade alternation was the ancient contact with speakers of Germanic languages a couple of thousand years ago. It is, however, obvious that the grade alternation in the Southern Finnic languages did not develop in the same way back then, as we know it from more recent times. There are important differences in grade alternation between all three Southern Finnic languages (cf. Kallio 2000: 92–93; Prillop 2011).

There is a traditional view that Livonian, like Veps, does not have grade alternation, and that these languages were not affected by the emergence of grade alternation (Kettunen 1938, 1951; cf. Posti 1938, Tunkelo 1938; Salminen 1998: 393–394). Tiit-Rein Viitso (2007) has, however, drawn attention to traces of grade alternation in Livonian. To be precise, the extremely limited occurrence of qualitative grade alternation is characteristic only of the Livonian dialects in Courland, whereas in Salaca Livonian it is more common (see Pajusalu 2009). Even in Courland Livonian weak grade forms are used, for instance in the words *tī'edõ* 'to do' and *nǟ'dõ* 'to see', which have striking counterparts in the Mordvin languages, where the Proto-Mordvinic forms of these verbs could, in principle, be reconstructed as **teje-* and **näje-*. Both words descend from an earlier Proto-Finno-Ugric form with a velar clusil: **teke-* and **näke-*. In Salaca Livonian, the loss of /k/ also occurs after a liquid consonant in the weak form of the words with a back vowel, e.g. *jalad* 'legs/feet' (LivK *jālgad*), although intervocalically a stop has normally been preserved as lenis, e.g. *lagùd* 'ceilings'.

Estonian is characterised by extensive qualitative grade alternation, but there are realisational differences between North and South Estonian. In some instances, the formation of weak grade in South Estonian is more similar to language forms in Eastern Finnic languages, cf e.g. EstN *jälg* : *jäljed* 'footprint, footprints', *kärg* : *kärjed* 'honeycomb, honeycombs' and EstS forms of plural nominative *jäle', käre'* (cf. Lehtinen 2007: 177). In western Finnish dialects, the alternationa of *lk* and *rk* corresponds to the North Estonian pattern, whereas in eastern Finnish dialects the clusil alternates with a complete loss similarly to South Estonian. Both in North and South Estonian, grade alternation is not entirely predictable by the phonetic shape of the word, but rather as a lexical feature of the word, cf. Estonian *lagi* : *laed* ‘ceiling, ceilings’, but *nagi* : *nagid* ‘coat-hook, coat-hooks’. Additionally, grade alternation in Estonian is intertwined with length alternation in word paradigms, which is particularly striking in South Estonian (see Iva 2010), e.g. in the paradigm of the noun *vaǵa* ~ *vagja* ‘pole.NOM’: Q1 *vaja* (GEN) : Q2 *vaḱḱa* (PART) : Q3 *vak̀ḱa* (ILL).

In Votic, too, there are special developments of grade alternation. While stressing pecularities of Votic grade alternation, Tapani Salminen has assumed Votic’s long life as an independent language (Salminen 1998: 396; cf. Itkonen 1983: 214–216). Among the characteristic features are, for instance, the alternation of the original single plosive /k/, short geminate and lenis-*g* in words containing a back vowel, e.g. in the forms of the verb *lukõa* ‘to read’: *lukõa* ~ *luk̆kõa* vs. *lugõn* ‘I read’ (cf. Finnish *lukea* : *luen*, Estonian *lugeda* : *loen*). Such grade alternation is largely reminiscent of the Estonian quantity alternation. In Votic, *g* appears in weak forms as a variant of /k/ in words containing a back vowel (see Kettunen 1930: 54). In some words, a stop occurs in the weak form in the Southern Finnic languages more generally, e.g. Estonian *jagada* : *jagan* ‘to share, I share’, *nagad* ‘tenons’, *kogud* ‘bodies’, *segud* ‘mixtures’.

Despite differences in qualitative grade alternation between the languages belonging to the Southern Finnic group, it is possible to bring out some general tendencies of development, such as, on the one hand, lexicalisation of grade alternation, and, on the other hand, convolution with quantity alternation into one complex alternation type, which Sulev Iva has called full alternation when describing South Estonian paradigmas.

2.5. Sound losses and stress shifts

Southern Finnic languages are well-known for their sound losses connected to various stress shifts in words, such as shortening of long vowels and diphthongs in non-initial syllables, apocope and syncope of vowels. These sound losses have caused changes in word prosody but at the same time have probably been associated with prosodic changes in words (Eek & Help 1986). Here, mutual influences of segmental and suprasegmental phonology are apparent. In addition to the losses with the so-called prosodic background, other losses of single sounds occur, which have an extensive regional spread, e.g. the loss of *h* in non-initial syllables and more restrictively in the beginning of words, and the loss of *n* at the end of a syllable in the *ns*-cluster, and later at the end of words.

Contraction of non-initial syllables and the resulting shortening of words is most common in Livonian, both in Courland and Salaca Livonian, e.g. LivSal *jala-d-k* foot-PL-COM ‘with legs, with feet’, *imis-t-l* people-PL-ALL ‘to people’, where all the vowels are lost in unstressed positions starting from the third syllable. This change could have been caused by the rise in the prominence of word-initial lexical stress, and the resulting weakening of secondary stresses. At the same time in Salaca Livonian, lexical suffixes have retained their stress and thus also their main structure: *ai/nika* ‘coastal dweller’, *ol/mis-t* ‘being-PART’ (Pajusalu 2009).

In Estonian, apocope has historically occurred in the second syllable only after a long first syllable, e.g. *tuul* (< **tūli*) ‘wind’ vs. *tuli* ‘fire’, but in Livonian, also after a short first syllable when the second syllable vowel was high or mid-high, e.g. *tu’ļ* ‘fire’, *va’l* ‘light’ (cf. Finnish *valo*). Apocope has also occurred in Estonian starting from the third syllable independently of the length of the preceding syllables, e.g. *madal* (< **matala*) ‘low’. Syncope, which appears in Estonian in the unstressed second syllable of trisyllabic and longer words when the first syllable has been long, e.g. *vahtra* (< **vahteran*) ‘maple-GEN’, can also occur in Livonian when the first syllable is short, cf. Livonian *sa’gdõ* ‘frequent-GEN’ and Estonian *sageda*. At the same time, syncope and apocope have been restricted in Livonian if the vowel in the unstressed syllable is low, cf. e.g. Livonian *mustā* ‘black’ and Estonian *must*, although syncope may have also occurred in words with *a* in the root, e.g. *mustliki* (< **mustalikki*) ‘dark’. Low vowels have resisted apocope and syncope probably due to their greater intrinsic duration which guaranteed the retention of the unstressed syllable.

When comparing syncope and apocope in North and South Estonian dialects, it is possible to see that sound losses are more regular in South Estonian. In North Estonian, there are quite large regions where no losses have occurred in some forms which have become a norm in Standard Estonian, for instance in unstressed syllables in words with high vowels, cf. EstN *õppima* ‘study-INF’, *pakkuma* ‘to offer- INF’ and EstS *opma, pakma*. Most limited is the occurrence of syncope and apocope in Northeast Estonian Coastal dialects. Also, in Votic, sound losses occur only sporadically, e.g. *ēstē* (< **ensiten*) ‘first of all’, *nahkīri* (< **nahka hīri*) ‘a bat’ (Kettunen 1930: 145). There are more examples of apocope in the old transcriptions of Krevinian Votic *üchs* (< **üksi*), *taiwas* (< **taivassa*) ‘sky.INE’.

In Estonian and Livonian, in addition to the vowels of unstressed syllables also long vowels and diphthongs of non-initial syllables have undergone shortening, and there has been loss of word-final *n*, e.g. Estonian *soomlane* (< **sōmelainen*) ‘a Finn’, Estonian *vagusi* ~ Livonian *vā’giž* (< **vakoisin*) ‘quietly’.

In both of these languages apocope and syncope are linked to important prosodic changes. In Estonian, it is the lengthening of the first syllable and the rise of overlong quantity, and in Livonian, the losses in the following syllable have caused the emergence of the broken tone in the preceding syllable, as can be seen from the examples of Livonian above. After extensive sound losses, Estonian and Livonian word prosodies have become typical of a fusional language – the structure of the syllable carrying primary stress can be very complicated, whereas the following unstressed syllables have undergone a structural simplification. In this way, the word prosodies of both languages have become more similar to the neighbouring Indo-European languages, while it is noteworthy that they are closer to Germanic than Baltic languages.

Sound losses in non-initial syllables made it possible for monosyllabic feet to emerge, and for two stressed syllables to be adjacent in a word. In older Estonian, typically, when an unstressed syllable was lost due to syncope, then historically the third syllable, which moved after the primary stressed syllable, retained the secondary stress as in *tütre·lle* (< *tüttäre-lle*) daughter-ALL ‘to the daughter’, *vahtra·ni* (< *vahtera-ni*) maple-TERM ‘until the maple’. In modern Estonian, the second syllable, which originally bore secondary stress, has lost its accentuation, and in corresponding words a primary stressed initial syllable is followed by two unstressed syllables, e.g. *tütrele, vahtrani*. Secondary stress has been preserved only in lexical affixes such as *kuulmi·ne* ‘hearing’, *kunstni·kku* ‘artist.PART’, but it is possible it will be lost there, too (see Pajusalu 2009). The roots of such changes are deep in the history of the languages, but compensatory prosodic restructuring processes are in progress even nowadays.

3. Changes in consonants

In addition to the above analysed changes in consonants, which are connected with prosodic phenomena, the following features characteristic of the Southern Finnic languages more broadly will be discussed below: palatalisation of consonants, occurrence of affricates, word- and syllable-initial consonant clusters, and the metathesis and loss of *h*.

3.1. Palatalisation of consonants

Proto-Finnic did not distinguish between the original Finno-Ugric palatalised and non-palatalised consonants any more, and even nowadays there is no palatalisation in Standard Finnish and western Finnish dialects, and little in Votic. Still, palatalisation of dental consonants is very common in Eastern and Southern Finnic languages, and is characteristic of Estonian and Livonian. Its origin could be in late proto-Finnic or in the immediately following period (see Itkonen 1968, Salminen 1998: 399). The spread of consonant palatalisation in Estonian and Livonian, in particular in South Estonian, could be explained by the influence of the neighbouring Baltic and Slavic languages. In these languages, palatalisation of consonants is a common linguistic trait.

In Estonian and Livonian, the development of palatalised consonants is linked to the influence of the following *i* and *j*, and is thus determined by certain language internal coarticulatory conditions. As regards the northern Finnic languages, the same development is met in eastern Finnish dialects and Karelian where the loss of word-final *i*, for instance, repeatedly triggered a secondary palatalisation of dental consonants (Kettunen 1960: 7; Mielikäinen 1981). The relatively old age of palatalised consonants is evident from the fact that they appeared before apocope and syncope, because the following *i* was a precondition needed for the palatalisation of consonants, e.g. Estonian *paĺk* < **palkki* ‘log’, *kańń* < **kanni* ‘toy’, but without palatalisaton *palk* < * *palkka* ‘salary’, *kann* < **kannu* ‘jug’.

In Standard Estonian, there are separate palatalised counterparts of alveolar consonants *ĺ*, *ń, ś* and *t́*, and in older pronunciation and dialects, also *ŕ*. In the

Livonian written language there are separate phonemes according to the Livonian orthography *ḑ, ļ, ņ, ŗ* and *ţ*; palatalised *ś* has developed into *š* and its voiced counterpart is *ž* (Posti 1942: 235–236). In Salaca Livonian, a palatal stop occurs, which is suggested by the interchanging transcription of *ḱ* and *ǵ*, and *t́* and *d́* in older materials, e.g. *ḱum* ~ *t́um* 'ten', *āǵist* ~ *ād́ist* 'year'.

In South Estonian dialects as in Russian, basically all consonants can get palatalised, if it is articulatorily possible. Palatalisation has an important role to play in distinguishing grammatical meanings, for instance it is one of the commonest markers of the preterite, cf. *võtt* '(s/he) takes' ja *võt́t́* '(s/he) took'. South Estonian and North Estonian also differ in the acoustic characteristics of palatalisation. In North Estonian dialects and Standard Estonian, it is the first part of the consonant that gets palatalised, and even a short epenthetic *i* can occur before the consonant, whereas in South Estonian palatalised and non-palatalised consonants have a different general formant structure (for a phonetic description see Org 2003).

The occurrence of palatalised consonants is restricted in more peripheral North Estonian dialects, and also in Votic. In Votic dialects, palatalisation mainly occurs as a coarticulatory phenomenon in words containing a front vowel or in Russian loan words, e.g. *ḱeüh́ä* 'poor', *gul′u* 'dove'. More specific and local developments in consonant palatalisation in Southern Finnic languages have been influenced by the neighbouring Baltic and Slavic languages.

3.2. Affricates

The position of affricates has been ambiguous in the research history of the Finnic languages. It has been maintained that the Proto-Finno-Ugric affricates were lost in late proto-Finnic (e.g. Korhonen 1981: 129). Petri Kallio has, however, pointed out that some South Estonian affricates, which have counterparts in Eastern Finnic languages, could be original, e.g. *katśki* 'katki' (early Proto-Finnic **kački-*), *katsk* 'plague' (**kačku*); it is more complicated to assume the loss and a secondary reappearance of affricates in these words (Kallio 2007: 234). The fact that this early occurrence has been preserved can indicate later contacts of South Estonian with Eastern Finno-Ugric languages, although more likely this implies that the development was peripheral and there was a supporting influence from the neighbouring Eastern-Baltic languages.

Despite the complete loss of old affricates in most Southern Finnic languages, a tendency for the emergence of new affricates is noticeable in all these languages. The richest set of affricates has been observed in the by now extinct Salaca Livonian by Sjögren in the middle of the 19th century. In Salaca Livonian, there were both voiced and voiceless alveolar and palato-alveolar affricates, i.e. four different phonemes, which were transcribed as *dz*, *dž*, *ts* and *tš*. Most of these were relatively new as to their origin, occurring mainly in Latvian loan words, e.g. *dzerul′* 'cranberry', *tsienig* 'merciful', *džuokžed* 'gums', *tšīkst* 'to creak', or were linked to palatalisation in words containing front vowels (Pajusalu 2009).

The development of affricates in South Estonian and Votic is also closely connected with palatalisation. The change *ti* (> *t́i* > *ći*) > *ci*, which has brought about affricates in South Estonian words such as *tsiga* (= *ciga*) 'pig' and *hüdsi* 'coal', already took place according to Petri Kallio in late proto-Finnic (Kallio 2007: 235); the same change caused the South Estonian forms *latś* (< **lapci*) 'child', *lätś* (< **läkci*) '(s/he) went', where the affricate has assimilated the preceding stop. A similar affricate occurs in the South Estonian forms of preterite such as *tiidze* '(s/he) knew', *võidzõ* '(s/he) could' (Pajusalu 2005), which could be regarded newer than late proto-Finnic. Particularly abundant in affricates is the South Estonian infant-directed speech, e.g. *tśudśo* ~ *tśüdśö* 'wolf', *tśäädśä* 'uncle', *tśidśa* 'sister', etc. (Pajusalu 2001). Pajusalu 2005 hypothesises that there was an extensive spread of affricates in South Estonian in the second half of the first millenium, when the forefathers of South Estonians came into close contact with the Latgalians. At any rate, the South Estonian affricates have become well adapted in the phonological structure of the language, also participating in quantity alternation in the three quantity degrees like stops and sibilants (Lippus 2006).

While South Estonian is characterised by alveolar affricates, which can also be palatalised, affricates in Votic are, as a rule, palato-alveolar. Such Votic affricates have developed via the palatalisation of *k* in words with front vowels, e.g. *tšerä* (< **kerä*) 'ball/coil', *tšäsi* (< **käsi*) 'hand' and, consequently, have a limited context with concrete constraints. Posti (1958) assumed that the rise of palato-alveolar affricates rose in a language contact with Novgorod Slavic. Standard Estonian, like Livonian, differentiates between alveolar and palato-alveolar affricates in late loan words, e.g. *tsehh* 'department (in the factory)' vs. *tšehh* 'Czech (nationality)' (see Pajusalu 2003). The retention of old affricates in South Estonian and the development of new affricates in all the Southern Finnic languages is a likely influence of Baltic and Slavic language contacts.

3.3. Word- and syllable-initial consonant clusters

In Finno-Ugric languages, consonant clusters cannot typically occur in the beginning of syllables, i.e. in syllable onsets. This restriction is also valid in word-initial position. In Southern Finnic languages, however, word-initial consonant clusters have been adapted.

The development of word-initial consonant clusters in the Estonian phonological system as compared to Finnish has been discussed by Birute Klaas (1995), and when commenting on her study an overview of Livonian consonant clusters is given by Kersti Boiko (1995). In her study, Birute Klaas shows that in older Baltic, Germanic, and Slavic loan words, the word-initial consonant clusters have been systematically replaced in Estonian by single consonants, but in Low German loan words (which originate from the first half of the second millenium) some consonant clusters have been retained, as for instance in Low German words *pruut* 'bride', *trepp* 'staircase' (Klaas 1995: 116; Hinderling 1981).

In these and other older Estonian loan words the retained word-initial consonant clusters mainly consist of sequences of a plosive and a liquid, as in the preceding examples. Such word-initial consonant clusters also occur in Estonian onomatopoeic words, e.g. *klõmm* ‘clunk’, *prauhti!* ‘slam!’ (ibid., p. 122). The fact that consonant clusters of this type may occur in Estonian also in the syllable-initial position is indicated by word forms without apocope, which are formed like the words containing a short first syllable, e.g. Karksi verb forms *kabli* ‘(s/he) hoes’, *sõglu* ‘(s/he) sifts/sieves’ as *ari* ‘harib’, *ludzi* ‘(s/he) sucks’, cf. *kuts* (< *kutsu) ‘(s/he) invites’, *murd* (< *murta) ‘(s/he) breaks’ (see Pajusalu 1996: 111–112).

Word-initial consonant clusters have also been adapted in Votic, e.g. *kranni* ‘pretty’ ‘*skŕopka* ‘(horse)comb, brush’. Word-initial consonant clusters are particularly abundant in Livonian, e.g. *skēd́* ‘chain’, *žnougõd* ‘gills’, but even there they occur mainly in newer loan words. Thus we can conclude that word-initial and syllable-initial consonant clusters have become phonotactically permitted in the Southern Finnic languages, although historically only secondarily and restricted to a certain degree until very recently.

3.4. Voiced stop consonants

Originally there were no voiced stops in Proto-Finnic. However, these have been adopted in a portion of Finnic languages, at first probably in Livonian, Karelian, and Veps (Viitso 1998: 109). The distribution of voiced stops in most Finnic languages is nevertheless restricted. In written Finnish, only word-medial voiced *d* is used in native words, which phonetically resembles more an alveolar tap and not an ordinary voiced stop. This phoneme, however, was adopted very recently from the written standard to vernacular language (Lehikoinen–Kiuru 1998: 74–75). In written Estonian, voiced stops only occur in newer foreign words, which in colloquial speech are pronounced as semi-voiced lenis stops (see Pajusalu 2003). Voiced stops are more common in the pronunciation of Livonian and Votic and in eastern and southernmost South Estonian dialects. In Livonian and Votic, voiced stops are used even in word-initial consonant clusters, most notably in young borrowings e.g. Livonian *brūț* ‘bride’, *grumā* ‘feud’, Votic *bruuda* ‘pond’, *drilisa* ‘to jingle’ (see Kettunen 1930; Suhonen 1973). In some loan words the word-initial voiced stop can be a hypercorrection, as is exemplified by Votic *bruuda*, cf. Russian *пруд*. Like voiced stops, voiced sibilants and affricates have been adopted in these languages (see 3.2.).

It is clear that voiced stops are largely of late origin in Southern Finnic languages and that their rise has been influenced by contacts with the neighbouring Indo-European languages where they occur everywhere. Nevertheless, Tiit-Rein Viitso (2008: 311), based on a comparison of Livonian berry-names *būolgõz* ‘lingonberry’ and *gārban* ‘cranberry’ with their counterparts in Finnic languages further East, finds that in some cases voiced stops may have originated from proto-Finnic or the immediately following early dialect alliance.

3.5. *h* metathesis and loss

The restricted distribution of *h* is one of the typical features of Finnic phonology. The distribution of *h* is most restricted in Livonian, where, like in Latvian, it appears only in new loan words. On the other hand, *h* is most widespread in eastern dialects of South Estonian, in particular Seto, where it can be retained even word-finally unlike in most Finnic languages: *pereh* 'family', *imeh* 'miracle', and in historic suffixes of non-initial syllables: *lätte-he* 'spring-ILL', *hõlpsahe* 'easily'. In South Estonian, *h* also appeared on syllable-boundaries in non-initial syllables after the loss of stops (or sibilants), e.g. *hõbõhõnõ* 'silvery', cf. **hopeδahinen*. At the same time, in South Estonian there has also been a metathesis of second syllable-initial *h* with the preceding consonant in certain cases: *kahr* (< *karhu) 'bear', *tahr* (< *tarha) 'fence'.

In most North Estonian dialects, *h* has been lost both word-initially and word-finally, and can occur only at the end of the primary stressed syllable after a short vowel or on the border of the first and second syllable, e.g. *tahke* 'solid', *tahe* 'will'. In intervocalic position too, *h* tends to get lost sporadically: *lääb* '(s/he) goes', *taab* '(s/he) wants'. If *h* followed a long initial syllable, there occurred a metathesis of diphthongs in North Estonian dialects and the Estonian written language, e.g. *jõhv* (< *jouhi) 'horsehair', *lahja* (< *laiha) 'lean', and a long monophthong was shortened in front of *h*: *maha* (< *maahen) 'down', *pähe* (< *päähen) 'to the head'. Similar tendencies can also be observed in Votic, where they, however, have not taken place so systematically. Nevertheless, restrictions on the distribution of *h* are characteristic of all the Southern Finnic languages, if we allow for a compromise in the case of eastern dialects of South Estonian.

3.6. The loss of word- and syllable-final *n*

There has been a relatively widespread loss of word-final *n* in Finnic languages (see Laanest 1982: 126–127), but this has been particularly large-scale in the southern group, and most probably has taken place in several stages, including more or less all the languages of the group. The older loss of *n* occurred in certain frequent lexicalised forms, e.g. Estonian *enne*, Votic *ennee* (< **ennen*) 'before', Estonian and Votic *nii* (< **niin*) 'so', Livonian *nei* 'so', and suffixes such as *-(i)nen*: Estonian *punane*, Votic *punanõ ~ punnan,* Livonian *punni* (< **punainen*) 'red'. Also, there has been a loss of *-n* in certain grammatical forms in all the Southern Finnic languages, for instance in genitive: Estonian *kirja* 'letter-GEN', Votic *tširja* 'book.GEN', Livonian *kēra* 'letter.GEN'. Word-final *-n* is, however, nowadays possible in all these languages, e.g. Estonian *urin* 'growl', Votic *paimõn* 'herdsman'. In Livonian, the suffix of the dative is marked by *-n*: *minnõn* 'to me', and thus there are no general phonotactic restrictions on the occurrence of word-final *n*, as it is the case with word-final *h* after a stressed syllable.

Certain changes of grammatical forms have spread over language-borders. For instance, if in Estonian and in the western dialect of Votic the ending *-n* of the verb in first person singular has been retained: *kannan* ‘I carry’, it has historically been lost in Eastern Votic and Southern Estonian dialects (where the form is *kanna*) as well as in Livonian, e.g. Salaca *taha* (1767) ~ *taa* (1789) (< *tahan*) ‘I want’, where it has later been compensated by the form of the third person by the analogy of past tense forms; thus after 1829 in Salaca Livonian *tāb* ‘I want’ (cf. Winkler, Pajusalu 2009: 190).

The loss of word-final *n* is relatively common in world languages, and it appears in several Finnic languages, e.g. in Finnish dialects *toinen* ~ *toine* ‘another’, Karelian and Vepsian *toińe*, Ingrian *pojalen* ~ *pojalle* (Laanest 1982: 126–127). The most extensive spread of this sound change in Southern Finnic languages shows first and foremost a common direction of change and long contacts of these languages.

The vocalisation of word-internal syllable-final *n* in the cluster *-ns* is another specific sound change linked to *n*: Estonian *maasikas*, Votic *maazikaz*, Livonian *mōškōz* (< **mansikas*) ‘strawberry’. This change is quite common in certain grammatical suffixes in Finnic languages in general, e.g. in the endings of ordinal numbers *-*ns(i)*, cf. Finnish and Estonian *kolmas*, Kar *kolmaš* (< **kolmansi*) ‘the third’ (see Laanest 1982: 124–125). Here again, we can observe the spread and extension of an old Finnic sound change to Southern Finnic languages.

4. Innovations in the vowel system

4.1. The rise of unrounded central vowels

A well-known innovation of Southern Finnic languages is the occurrence of an unrounded central vowel, e.g. Estonian, Livonian, and Votic *õ*. The vowel is not found in Northern Finnic languages and it has been usually explained as a result of secondary development in the Finnic vowel system (see Holst 2001: 59–62). Such a central vowel occurs in all the Southern Finnic languages, being absent only in the North Estonian Coastal dialect and the Kukkuzi dialect of Votic (see Viitso 2008: 45). Often language historians consider only one central vowel, but it has to be noted that in South Estonian and in Courland Livonian there are two unrounded central vowels which are phonologically back. A phonetic description of the difference between the two South Estonian central vowels, and a phonological interpretation are presented in Parve 2000, and an overview of the acoustic data regarding the pronunciation of the two Livonian central vowels can be found in Lehiste et al. 2008: 84–91.

The difference between the two unrounded central vowels in both South Estonian and Livonian is associated with their height. Both languages have a mid-high and a high central vowel. In South Estonian the mid-high vowel, so-called back *e* is spelled as *õ* and the high vowel, so-called back *i* is marked as *y* in some versions of spelling. In Courland Livonian the high unrounded back vowel is spelled as *õ* and the mid-high vowel as *ȯ*. The two vowels have a different status in these languages. In South Estonian, the mid-high central vowel is more common, occurring both in stressed and unstressed syllables, but in Livonian it is the high central vowel that occurs more frequently.

The South Estonian high unrounded *y* [*ı*] appears in various phonetic environments, and the mid-high and high central vowels in South Estonian are undoubtedly two separate phonemes (see Parve 2000: 13). The distribution of these two phonemes provides a basis for the diachronic analysis below. The mid-high vowel of Livonian, on the other hand, occurs only in a stressed syllable after labial consonants in words which historically contained the vowel *o*, *pȯsk* (< *poski) ‘cheek’, *pȯigõ* (< *poiki-) ‘to calve/to lamb/to farrow’, *vȯ’dri* (< *otra) ‘barley’. Therefore this sound could be considered a late allophone of the phoneme */o/*. Also, in modern Courland Livonian, *ȯ* is lightly rounded (see Lehiste et al. 2008, Table 32A).

Traces of the historically older difference between two central vowels can also be found in the transcriptions of Salaca Livonian from 1839 by D. H. Jürgenson, an Estonian scholar (see Winkler 1999). Although normally in Salaca Livonian a central vowel has been transcribed with an *y* (or *ü*), e.g. *mütsa* ‘forest’ (see Winkler, Pajusalu 2009: 127; cf. EstS *mõts*), Jürgenson uses *ö* to mark a presumably mid-high central vowel: *mötſa*, or sometimes even *õ*: *kõue* thunder.SG.GEN. He only uses *ü* in words where there is a high central vowel in South Estonian: *ſünna* ‘word’, cf. EstS *sı̮na* (Jürgenson‘s transcriptions have been published with comments in Winkler 1999: 174–183).

It is possible that the difference between the South Estonian high and mid-high unrounded back vowel was earlier present also in other Southern Finnic languages and was later neutralised. This is indicated by the alternation of *õ* and *i* in words such as EstN *sõsar* ~ Finnish *sisar* ‘sister’, LivE *sõzār* ~ LivW *sizār*, or Livonian *tõva* (< **tı̮va*) ‘deep’ vs. the rest of Finnic *süvä* (< **tivä*). The various counterparts of the South Estonian high and mid-high central vowel in other Finnic languages suggest that an unrounded central vowel in Southern Finnic languages has two origins, while the high *ı̮* could be even older than the formation of the language group itself. The emergence of mid-high *õ*, however, is influenced by an earlier high *ı̮*; when in Baltic and German loan words containing back vowels in the stem, the front vowel *e* was replaced by the corresponding back mid-high vowel *õ*, and later the change spread to the stems with an *o* in the first syllable.

Although nowadays in the heavily levelled South Estonian pronunciation, one can encounter alternately the high and mid-high central vowel, and more generally they coincide in certain positions, e.g. the counterpart of the long mid-high *õõ* in the overlong quantity is always a high *ı̮ı̮*, a group of words with an originally high *ı̮* is discriminable on the basis of older transcriptions, such as EstS *sı̮sar* ‘sister’ (cf. EstN *sõsar*, Votic *sõzar*, Livonian *sõzār*, LivW *sizār*, LivSal *süsär*, Finnish *sisar*), *nı̮na* ‘nose’ (cf. EstN *nina*, Livonian *nanā*, Votic and Finnish *nenä*), *kı̮ik* ‘all/everything’ (cf. EstN *kõik*, Votic *kõittši*, Finnish *kaikki*), *hı̮im* ‘tribe’ (cf. EstN *hõim*, Livonian *aim*, Votic *õimo*, Finnish *heimo*), *sı̮na* ‘word’ (cf. EstN Votic *sõna*, Livonian *sõnā*, LivSal *süna*, Finnish *sana*). As a rule the counterpart of the South Estonian high central vowel in North Estonian is either *i* or *õ*, in Livonian *i, õ* or *a* (the Salaca Livonian *ü* probably originates from a high unrounded central vowel), in Finnish *i, e* or *a*. In these words, certain fluctuations can occur in the western dialects of South Estonian, where a stronger contact with North Estonian or Livonian is apparent, and thus the following can alternate: *i̯* and *i*, e.g. *ri̯nd* 'breast' ~ *rind*, *i̯* and *õ*, e.g. *hi̯im* ~ *hõim*, or *i̯* and *a*, e.g. *ni̯na* ~ *nana*, also in the dialect of Leivu *aim* 'tribe'. It is nevertheless noteworthy that among the words containing a high unrounded central vowel there are no words which originally had an *o* in the front syllable.

Among the words with a high central vowel, there are, on the one hand, ancient words with an affective origin, which could belong to the old proto-Finnic layer of native words, such as *si̯na* 'word', *ni̯na* 'nose', *si̯salik* 'lizard', or, on the other hand, old (Proto-)Baltic loan words, such as *si̯sar* 'sister', *ki̯ik* 'all/everything', *hi̯im* 'tribe'. A South Estonian high *i̯* appears mostly in old loan words which have a first-syllable *a(i)* in a source form (i.e. *si̯sar* ? < *sasara and *hi̯im* ? < *šaima); the mid-high *õ* is an ordinary equivalent of the Baltic *e* in the back words, e.g. *kõrd* (< *kerdā), *mõts* 'forest' (< *media-), *võlg* (< *velkā). In Germanic loan words, where there was originally an *a* in the stem, it has been preserved in the Northern group of Finnic languages, e.g. *lanka* 'yarn', as well as in the southernmost Finnic languages in South Estonian and Livonian, cf. EstS *lang*, Livonian *lānga*, the change *a* > *õ* has occurred only in North Estonian and Votic: EstN *lõng*, Votic *lõnka*. Similar is the situation with Finno-Ugric stems containing an *o*, where the central vowel has appeared only in North Estonian and Votic, cf. EstN *õppida* 'to study', Votic *õppõa*, but EstS *oppi*, Livonian *oppõ*. It is possible that the high central vowel was already present in the southern or southeastern dialects during the period of development of proto-Finnic, and during the period of Baltic (or Western Indo-European) loans, spread via these loan words in the Southern Finnic languages. There are at least traces of it in South Estonian, and indirectly in Livonian. The mid-high *õ*, however, developed secondarily next to the high *i̯* in the Southern Finnic languages together with the adaptation of new Baltic and Germanic loan words with an *e*-stem. Later, /õ/ spread in North Estonian and Votic into an increasing number of stem-types, reaching the widest spread in Votic and in the eastern and north eastern dialects of North Estonian.

4.2. Velar vowel harmony

In addition to the distribution of central vowels in the stressed syllables it is important to pay attention to the velar vowel harmony in the Southern group of Finnic languages, where an unrounded central vowel appears instead of the original /e/ and in Votic also /o/ in the non-initial syllables of words containing a back vowel. Velar harmony is typical in Votic and South Estonian, e.g. Votic *oonõ* 'building' (cf. Finnish *huone*), *punõn* 'to twist/to weave' (Finnish *punon*), EstS *panõ* 'pane' (Finnish *pane*), *põlvõl* 'on the knee' (Finnish *polvella*), but also occurs in the North Estonian dialect of the Kihnu island, e.g. *lapsõd* 'children' (Finnish *lapset*), *olimõ* 'we were' (Finnish *olimme*). In Livonian, too, the unrounded central vowel is widespread, but its distribution there is not linked to vowel harmony; the /õ/ of the non-initial syllables is essentially reduced and it appears both in words with front and back vowels in Livonian, e.g. Livonian *vä'ggõ* 'power', *sä'dgõz* 'spark', *mõtlõ* 'to think'.

It is possible that historically the unrounded back vowel occurred in Livonian in an unstressed second syllable in words where it is now compensated by /a/, e.g. *pūola* 'knee' (< *polvõ), *tōla* 'winter' (< *talvõ). Also, in the old North Estonian written language, there are several examples which show that /a/ has been replaced by the otherwise predicted /õ/ in words with back vowels: *sulana* 'farmhand', cf. EstS *sulanõ*, *sura* 'big.SG.GEN', cf EstS *suurõ*. It is probable that even the unpredicted /a/ in several forms, for instance, in plural forms, has developed from an earlier central vowel (see Pajusalu 2000). Therefore it can be postulated that /õ/ has once also occurred in non-initial syllables in all the Southern Finnic languages, and that velar vowel harmony can be considered a historic common feature of the language group.

High and mid-high central vowel occur both in unstressed syllables only in the easternmost South Estonian dialects, but at least in modern language usage, the high central vowel is neutral to vowel harmony, occurring mainly as an epenthetic vowel in words such as *mügi̯r* 'mole', *vedi̯r* 'spring', *nõgi̯l* 'needle' (Parve 2000: 24–28). Nevertheless, a possible earlier occurrence of *i*-harmony has been mentioned by Mihkel Toomse in his extensive study of South Estonian dialects, where he points out that the second syllable vowel /i/ in the South Estonian dialects of Seto and the language enclaves is velarised in words containing a back vowel, although admittedly with a relatively varying quality (see Pajusalu 1990: 162).

Velar vowel harmony is not typical of Finnic languages, except for the southern group, and there is no vowel harmony in the neighbouring Indo-European languages. Therefore, it could be considered an innovation which has occurred in the southern periphery of Finnic and whose old age is evident by its occurrence in the whole language group. Here, however, a similarity with Mordvinic languages is noteworthy, where there are traces of velar vowel harmony, cf. Erzya *ašo* 'white' vs. Moksha *äšä* 'cold'. This implies at least similar starting conditions for the emergence of velar vowel harmony.

4.3. Restrictions in the vowel system of non-initial syllables

In Southern Finnic languages, there are innovative developments of vowel harmony, but at the same time all these languages are characterised by the gradual retreat of vowel harmony, and there has occurred its general loss in Estonian and the Livonian written language. Still, vowel harmony occurs to a certain extent in almost all Estonian dialects, and the emerged restrictions are regular (see Wiik 1988; Kiparsky, Pajusalu 2003). One can find traces of vowel harmony in Salaca Livonian, too, e.g. *leibätk* 'with breads', *šüömät* 'uneaten', *ḱirüg* 'flame', where often also the second part of late diphthongs has remained harmonious: *püäd* 'holidays, party', *tüö* 'work' (see Pajusalu 2009b). The restricted occurrence of vowel harmony in Southern Finnic languages is clearly secondary. It can be best treated together with prosodic changes and similarily explained by direct or indirect influences of the neighbouring Indo-European languages. As the Southern Finnic languages have largely become fusional, they have started losing their vowel harmony, which is untypical of fusional languages.

In addition to the loss of vowel harmony Southern Finnic languages are characterised by the reduction and peripheralisation of vowels in unstressed syllables. Here, the best example is the Livonian written language, where non-initial syllables can only contain the vowels *a, i,* and *õ*, and starting from the third syllable only *i* and *õ* can occur. Many Estonian dialects and Literary Estonian have undergone the vocalic change *o* > *u*, e.g. *kadu* 'loss' (cf. Finnish *kato*), and modern Estonian is characterised by the lowering of unstressed /e/ (see Pajusalu 2009a). Such changes can also be explained by a strong long-term influence of the neighbouring Indo-European languages, in particular that of Germanic languages.

5. Summary

The Southern Finnic languages have undergone several phonological innovations that are not characteristic of the Finnic languages further north. A comparison of these sound changes in Table 1 reveals that they occur most extensively in South Estonian and Livonian. These two languages are the southernmost, and can thus be considered the most typical representatives of the group. This outcome shows that the characteristic features of this language group are in accordance with its location in the Baltic area, which provides a basis for their geographical interpretation, i.e. by regional features of such language contacts, possible substrate phenomena, etc.

Feature	Vot	Liv	EstN	EstS
Unrounded central vowel	+	+	+/-	+
Velar vowel harmony	+	-	-	+
Reduction of unstressed vowels	+/-	+	+	+
Affricates	+	+	-	+
Foot isochrony	+/-	+	+	+
Monosyllabic feet	+/-	+	+	+
Palatalization of consonants	+	+/-	+/-	+
Quantity alternations	+/-	+	+	+
Restricted grade alternation	+/-	+	+/-	+/-
Stress shifts	-	+/-	+/-	+
Score	6,5	8	6	9,5

Table 1. Common phonological innovations of Southern Finnic languages.

Besides the influence of the neighbouring Indo-European languages, factors that might explain the characteristic features of Southern Finnic languages are the peripheral location, mutual contacts between the languages of the group, and hypothetically, also the influences from other, now extinct, Finno-Ugric languages. For instance, if we compare the Southern Finnic languages with Mordvin languages, we can see several similar traits, including the above example concerning velar vowel harmony, but also the unrounded central vowel of the stressed syllable, e.g. Moksha *kə̂rda* ‘time’, the wide-spread palatalization of consonants: *eś* ‘(one)self’, etc. Part of the common features of Southern Finnic and Mordvin sound systems can be explained by similar Baltic and Slavic influences, although not everything; also likely are similar contacts within the language family and a common substrate. This might be also indicated by some similarities between the Southern Finnic languages and Saamic, which were not treated here.

Abbreviations

ALL	Allative	EstN	North Estonian
COM	Comitative	EstS	South Estonian
GEN	Genitive	LivE	Eastern Livonian
ILL	Illative	LivK	Courland Livonian
INE	Inessive	LivW	Western Livonian
INF	Infinitive		
NOM	Nominative		
PART	Partitive		
PL	Plural		
SG	Singular		
TERM	Terminative		

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The Prehistoric Germanic Loanword Strata in Finnic

1. Introduction

1.1. Germanic

Germanic is an intermediate stage between the reconstructed Indo-European proto-language and all the modern Germanic languages, such as English and German (see Figure 1). As to the disintegration of Proto-Indo-European, I refer to Asko Parpola's article in this volume.[1] From the disintegration of Northwest Indo-European during the third millennium BC, the Germanic branch developed on its own until the mid-first millennium BC, when Germanic itself began to disintegrate into its dialects, as attested by classical authors. Since the Germanic branch underwent a lengthy period of independent development, it is no wonder that Proto-Germanic had become very different from Northwest Indo-European. Thus, it is also necessary to postulate intermediate stages between Northwest Indo-European and Proto-Germanic. I shall return to these stages only later in this paper, as our most direct evidence of them comes from loanwords in Finnic and Saamic (see Aikio 2006 on the latter).

1.2. Finnic

The difference between Germanic and German can be compared with that between Finnic and Finnish, namely that Finnic is simply an intermediate stage between the reconstructed Uralic proto-language and all the modern Finnic languages, such as Finnish and Estonian (see Figure 2).

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[1] Since linguistically reconstructed proto-languages were not spoken in a vacuum without any contact with the archaeologically reconstructed outside world, the former can and must still be compared with the latter, although there are of course exceptions to one-to-one correlations between linguistic groups and archaeological cultures (see e.g. Simon 2008: 290–293; Aikio this volume).

A Linguistic Map of Prehistoric Northern Europe.
Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 225–238.

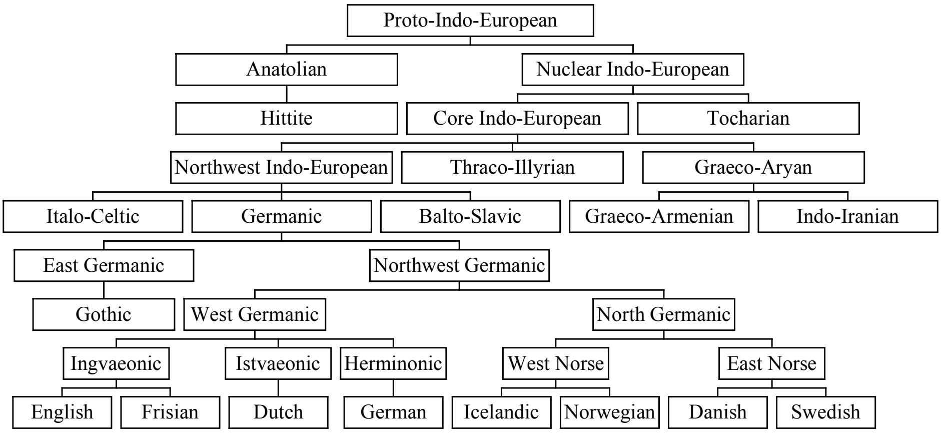

Figure 1. The position of Germanic.[2]

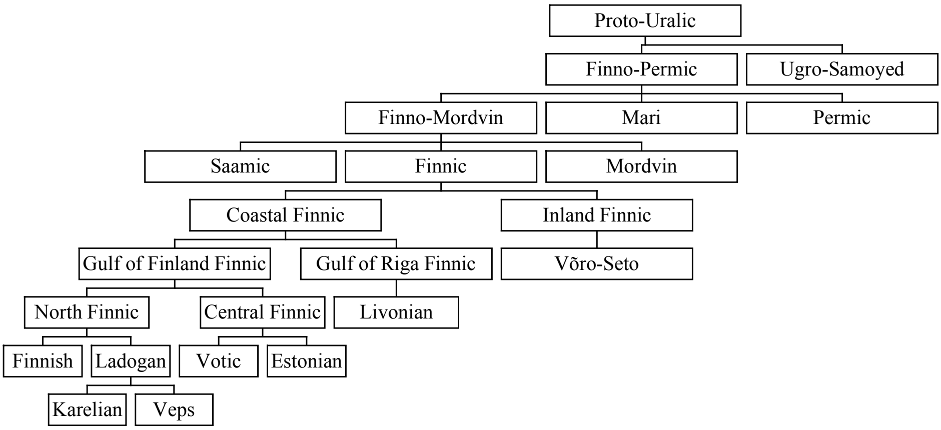

Figure 2. The position of Finnic.[3]

As I have argued elsewhere (Kallio 2007: 245–246), Finnic is similar to Germanic in the respect that the Finnic branch also underwent a very long separate development lasting from the disintegration of Proto-Finno-Mordvin during the second millennium BC until the disintegration of Late Proto-Finnic during the first millennium AD. Again, I shall deal with the postulated intermediate stages between Proto-Finno-Mordvin and Late Proto-Finnic later in this paper.

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2. This family tree is a compromise of numerous earlier family trees (on which see e.g. Blažek 2007). Note that Thraco-Illyrian is simply used as a cover term for several poorly attested Palaeo-Balkan languages, one of which was the ancestor of modern Albanian.

3. This family tree combines the Pre-Finnic one by Jaakko Häkkinen (2007: 63–81) with the Post-Finnic one by myself (Kallio forthcoming).

2. Prehistory

2.1. The Stone Age

Of course, we cannot speak of Stone Age Germanic or Stone Age Finnic. However, the ancestors of Germanic and Finnic were already in contact with one another during the Stone Age, as illustrated by the following examples:

- Northwest Indo-European _*b^{h}l(e)h$_{1}$tó-_ (> Old Norse _blað_, Old English _blæd_, Old High German _blat_) 'leaf, blade' → Pre-Finnic _*lešti_ > Finnish _lehti_ 'leaf, blade' (Koivulehto 2002: 584).
- Northwest Indo-European _*h$_{2}$aḱi̯áh$_{2}$_ (> Old Norse _egg_, Old English _ecg_, Old High German _ekka_) 'point, edge' → Pre-Finnic _*kaća_ > Finnish _kasa_ 'point, edge' (Koivulehto 2002: 583).

As we can see, the Northwest Indo-European source language is still just a dialect of Proto-Indo-European, because there is nothing in its phonology or word-formation that would point to Germanic. Yet the fact that these particular derivatives are later attested in Germanic alone shows that we are indeed dealing with either the genetic ancestor of Germanic or at least its closely related Northwest Indo-European dialect. As Proto-Indo-European was spoken around 4000–3500 BC (see e.g. Parpola 2008), its Northwest Indo-European dialect can plausibly be dated to the Corded Ware period (ca. 3200–2300 BC). In any case, Northwest Indo-European was phonologically much more archaic than the earliest attested Indo-European languages, such as Hittite (ca. 1900 BC), Mitanni Aryan (ca. 1500 BC), and Mycenaean Greek (ca. 1450 BC).

As for the target language, the concept of Pre-Finnic is used here to refer to any chronological stage between Proto-Finno-Permic and Early Proto-Finnic which are phonologically so close to each other that they are most often indistinguishable. As also the distribution of the Northwest Indo-European loanwords can be anything from Finno-Permic to Finnish, these loanwords can only be dated on the basis of the phonology of their source. In general, the Indo-European loanwords should never be dated only on the basis of their distribution in the Uralic languages, contrary to what has been the general view among the Uralicists (e.g. Rédei 1986).

It is easier to say when than where the Northwest Indo-European loanwords were borrowed into Pre-Finnic. While some sort of connection between Northwest Indo-European and the Corded Ware culture is evident for both chronological and distributional reasons, the problem is that the Corded Ware area included both the earlier Finno-Mordvin homeland in the Volga area and the later Finnic homeland in the East Baltic area. Thus, the contacts between Northwest Indo-European and Pre-Finnic may have taken place in either one of these areas. More probative evidence comes from the loanwords borrowed from some early _centum_ dialect:

- Proto-Indo-European _*ǵn̥h$_{3}$i̯o-_ > Pre-Germanic _*gn̥ni̯o-_ (> Old Norse _kyn_) 'wonder' → Pre-Finnic _*konïš_ > Finnish _kone_ 'magic', from which only recently 'machine' (Koivulehto 2002: 586).

As the centumization is shared by all the *centum* languages, the Pre-Germanicness of the source is once again based on its later attestation in Germanic alone. Still, the fact that Germanic is the only *centum* branch spoken anywhere close to Finnic makes any other *centum* source less likely, even though the theory of a *centum* substrate in Balto-Slavic still has its proponents (e.g. Andersen 2003, 2009). In any case, the concept of Pre-Germanic seems to be well-founded here.

However, as the number of the Pre-Germanic loanwords is very limited, they do not suggest particularly intensive contacts between the late Neolithic ancestors of Germanic and Finnic, but these words may even have been borrowed through some third party, just as several later Germanic loanwords were borrowed through Finnic into Volgaic and Permic (cf. Hofstra 1985: 391–402). In theory, therefore, Pre-Finnic could still have remained in the Upper Volga area at the time when its Pre-Germanic loanwords were borrowed through some possibly related language spoken in the East Baltic area.

Indeed, it seems likely that the late Neolithic languages in the East Baltic area included sisters and/or daughters of Proto-Uralic, because there were several cultural waves from the Upper Volga area to the East Baltic area as early as the Subneolithic period already (ca. 5100–3200 BC). In any case, the presence of Pre-Finnic itself in the East Baltic area during the late Neolithic period (ca. 2300–1900 BC) can also be questioned (see Kallio 2006b: 11–13).

2.2. The Bronze Age

Although the actual Germanic and Finnic proto-language levels were not reached until the Iron Age, it was the Bronze Age when both Germanic and Finnic came into being as distinct linguistic groups. According to my recent “provocative guess” (see Kallio 2006b: 16–17), Pre-Finnic spread from the Upper Volga area to the East Baltic area exactly at the beginning of the Bronze Age around 1900 BC. In turn, it has long been a common view that there were several Germanic-related waves from southernmost Scandinavia to the East Baltic area from 1600 BC onwards, and in particular during 1400–1200 BC and 900–700 BC (Carpelan & Parpola 2001: 90–92).

As 450 “early Germanic” loanwords had already been discovered in Finnic more than a quarter of a century ago (Itkonen 1983: 225), their number must now be close to 500, of course depending on the definition of “early Germanicness”. As a matter of fact, there are only 114 loanwords that are markedly “early Germanic”, viz. earlier than the reconstructed Late Proto-Finnic stage (Aikio & Aikio 2001: 19–21). Yet many of these loanwords can further be stratified based on their phonology. For instance, the earliest stratum consists of borrowings whose vocalism clearly points to a more archaic source than Proto-Germanic, here labelled Palaeo-Germanic:[4]

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[4] The concept of ‘Palaeo-Germanic’, first introduced by Theo Vennemann (1984), here corresponds to the concept of ‘Early Proto-Germanic’ by Frans Van Coetsem (1994).

- Palaeo-Germanic **kāpa-* (> Old Norse *hófr*, Old English *hōf*, Old High German *huof*) 'hoof' → Pre-Finnic **kapa*, suffixed with **-ja(w)* > Finnish *kavio* 'hoof' (LägLoS 1996: 69–70).
- Palaeo-Germanic **sāgja-* (> Gothic *sōkjan*, Old Norse *sœkja*, Old English *sēcan*, Old High German *suohhen*) 'seek' → Pre-Finnic **šakï-* > Finnish *hakea* 'seek' (LägLoS 1991: 68–69).

As Pre-Finnic had no long **aa*, its short **a* was substituted for Palaeo-Germanic long **ā* (> Proto-Germanic **ō*). Indeed, the Palaeo-Germanic loanwords in Finnic support the idea that Pre-Germanic **ā* and **ō* first merged as Palaeo-Germanic **ā* which only later shifted to Proto-Germanic **ō* (cf. Van Coetsem 1994: 76–81).

Palaeo-Germanic largely dates to the Nordic Bronze Age (ca. 1800–500 BC), at the end of which, however, it had almost reached the Proto-Germanic stage. Now the problem is that the Germanic loanwords in Finnic do not show perhaps the most characteristic Proto-Germanic innovations, namely Grimm's Law and the accent shift to the initial syllable.[5] In most cases, therefore, it is impossible to decide if the source language was Palaeo-Germanic or Proto-Germanic, even though one can only see the latter reconstructions in the scholarly literature (e.g. LägLoS 1991–2012).

As a matter of fact, the best evidence for a Bronze Age date comes from the Finnic side. For instance, the Bronze Age loanwords often have regular cognates in Saamic and therefore seem to go back to the Proto-Finno-Saamic stage. Even when they do not have cognates in Saamic, their phonological structure corresponds to the same Early Proto-Finnic stage (on which see Lehtinen 2007: 82–93). This stage has generally been dated to the Bronze Age (see the Table in Kallio 2006b: 2, 24), and I see no reason to disagree (see Kallio 2007: 245–246).

As the Bronze Age date of the earliest strictly Germanic loanwords in Finnic has long been acknowledged among both archaeologists (e.g. Salo 1969) and linguists (e.g. Koivulehto 1971–1973),[6] I do not need to go into further details. Still, while the Bronze Age loanword stratum was no doubt important, it must not be overestimated at the expense of the Iron Age loanword strata. For instance, we cannot date Finnish *lattia* 'floor', *miekka* 'sword', *patja* 'mattress', and *vaatia* ‘demand’ to the Bronze Age (cf. Salo 2008: 90–111), because they are phonotactically too modern to have existed before the Late Proto-Finnic stage (on which see Lehtinen 2007: 137–154).

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[5] First, Finnic had only one series of stops, **T*, which was substituted for both Pre-Grimm **T*, **D*, **Dh* and Post-Grimm **Þ*, **T*, **D*. Second, Finnic had fixed initial stress even in loanwords whose sources had a completely different accentuation.

[6] Leaving aside the Nostraticists (e.g. Xelimskij 1995) who have their own obvious reasons for denying any ancient contacts between Indo-European and Uralic, the most vocal critic of the earliest Germanic loanword strata in Finnic was the late Ralf-Peter Ritter (1993) who, however, mostly cited the German-language history of research by Tette Hofstra (1985) rather than the original Finnish-language primary studies by Jorma Koivulehto and others. Thus, either Ritter was unaware of standard scholarly practice, or he felt uncomfortable to read Finnish, something that should be rather embarrassing for anyone who is supposed to critically discuss etymologies of Finnic words. It is therefore no wonder that he failed to achieve recognition in Fennistic circles outside his native Germany, and even there his anti-Koivulehto sentiments were never shared by the grand old man of the field, Hans Fromm (1997). In non-Fennistic circles, however, Ritter managed to gain more credibility, no doubt because it was easier for him to get away with his selective citation, distorted interpretation of conclusions, and deliberate misinterpretation of others' results (on which see e.g. Häkkinen 1994; Koivulehto 1997).

2.3. The Iron Age

While the disintegration of the Germanic proto-language has generally been dated to the Pre-Roman Iron Age (ca. 500–1 BC), that of the Finnic proto-language can hardly have occurred until the Middle Iron Age (ca. 400–800 AD), because Common Finnic still has Christian terminology of Slavic origin, dating to the eighth century AD at the earliest (see e.g. Kallio 2006a: 156–157). Thus, Late Proto-Finnic was not concurrent with Proto-Germanic but Early Runic (ca. 200–500 AD).

As there is such a long temporal gap between the Early and Late Proto-Finnic stages, I recently introduced the Middle Proto-Finnic intermediate stage (Kallio 2007: 234–235). No less than seven Early Proto-Finnic consonant phonemes (viz. **č*, **ś*, **δ*, **δ´*, **γ*, **ń*, **ŋ*)[7] had already been eliminated by the Middle Proto-Finnic stage (Kallio 2007: 231–235), after which typical Late Proto-Finnic morphophonemic alternations arose, such as consonant gradation (Kallio 2007: 235–243).

In loanword studies, however, even more important than historical phonology is historical phonotactics. Early Proto-Finnic already had several new consonant clusters, which are not found in Proto-Uralic (see Sammallahti 1988: 491–494, 1998: 198–202). Still, even more new consonant clusters arose between the Early and Middle Proto-Finnic stages, and very often they were introduced through Germanic loanwords. For instance, after all the Early Proto-Finnic palatalized consonants had been depalatalized, many clusters containing a consonant + **j* were introduced into Middle Proto-Finnic through loanwords from Germanic (or sometimes also Baltic):

- Proto-Germanic or Northwest Germanic **asjōn-* (> Old Swedish *æsia*, Old High German *essa*) ‘forge’ → Middle Proto-Finnic **ašjo* > Finnish *ahjo* ‘forge’ (LägLoS 1991: 5–6).
- Proto-Germanic or Northwest Germanic **ansjō* (> Old Norse *æs*, Middle Low German *ŏ̄se*) ‘loop’ → Middle Proto-Finnic **ošja* > Finnish *ohja* ‘rein’ (LägLoS 1996: 309).[8]

The examples above are particularly interesting because they are indisputably Middle Proto-Finnic. First, they cannot be Early Proto-Finnic whose **ś* would more probably have been substituted for **sj*. And second, they cannot be Late Proto-Finnic which no longer had **š*. The simplification **nsj* → **šj* also shows that Middle Proto-Finnic still had no actual three-consonant clusters (contrary to Late Proto-Finnic),[9] even though it had clusters of a resonant + a geminate obstruent (contrary to Early Proto-Finnic):[10]

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[7] There are no reasons to reconstruct the phoneme **l´* (cf. Kallio 2007: 230, 233), which hardly has any comparative evidence (see e.g. Sammallahti 1988: 491) and whose coexistence with the cluster **lj* (cf. **ńeljä* ‘four’) would also have been typologically problematic. Note that the phoneme **ŕ* did not exist either, but only the cluster **rj* (cf. **śarja* ‘spar’).

[8] As for first-syllable vocalism, the substitution **a* → **o* was regular before a nasal, even though the substitution **a* → **a* was regular elsewhere. As for second-syllable vocalism, the substitution rules remain vague (cf. Sundberg 2001; Palviainen 2004).

- Proto-Germanic or Northwest Germanic _*maldjō(n-)_ (> Old Swedish _mæld_, Old English _melde_, Old High German _melta_) 'orach' → Middle Proto-Finnic _*malcca_ > Finnish _maltsa_ 'orach' (LägLoS 1996: 248–249).
- Proto-Germanic or Northwest Germanic _*anþja-_ (> Old Norse _enni_, Old High German _endi_) 'forehead' → Middle Proto-Finnic _*o(n)cca_ > Finnish _otsa_ 'forehead' (LägLoS 1996: 312–313).

Then again, there were no clusters of a semivowel + a geminate obstruent in Middle Proto-Finnic:

- Proto-Germanic or Northwest Germanic _*raidjaz_ (> Old English _rǣde_) 'mounted' → Middle Proto-Finnic _*raccas_ > Finnish _ratsas_ 'riding, etc.' (LägLoS 2012: 133).

Note that the earliest diphthongs arose from combinations of a vowel + a semivowel after the Middle Proto-Finnic stage (cf. Kallio 2007: 238–241). As there were also no long vowels in closed syllables until the Late Proto-Finnic stage, the possible Middle Proto-Finnic syllable types were open _*(C)V(V)-_ and closed _*(C)V(R)C-_. Remarkably, while Early Proto-Finnic had only had long vowels in _e_-stem words,[11] this phonotactic constraint was lost by the Middle Proto-Finnic stage:

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[9] According to the common opinion, the only exception was the cluster that was later reflected as Late Proto-Finnic _*str_. This cluster is generally reconstructed for only four Late Proto-Finnic words, namely _*astraγa_ 'fishing spear', _*istra_ 'lard', _*kesträ_ 'spindle', and _*ostra_ 'barley', the first two of which had only lately been borrowed from Middle Slavic _*astragā_ (> Russian _острога_) 'fishing spear' and North Germanic _*īstra-_ (> Old Norse _ístr_) 'lard', respectively. Thus, only the latter two words can go back to Pre-Finnic where their cluster is most usually reconstructed as _*štr_, based on Mordvin _штере/кштирь_ 'spindle'. Still, as Proto-Mordvin _*št_ was often metathesized from Pre-Mordvin _*č_ (cf. Keresztes 1986: 37, 115–116, 155, 163; 1987: 151–152), the word for 'spindle' could in fact be reconstructed as _*kečrä_ (← Pre-Indo-Iranian _*kētstro-_ > Sanskrit _cāttra-_ 'spindle'; Koivulehto 1979: 71–78). Furthermore, the word for 'barley' could also be reconstructed as _*očra_ or _*oćra_ (← Proto-Iranian _*acra-_ or Proto-Indo-Iranian _*aćra-_ > Sanskrit _aśra-_ 'sharp > corner'; cf. Koivulehto 1979: 67–71), which can even further be compared to Komi-Zyryan _öч_ 'grain' (cf. Lytkin 1975: 91–93). However, the latter word, because of its irregular vocalism and limited southwestern distribution (Luza-Letka), is hardly a cognate but rather a borrowing from some eastern Finnic source, which had after all preserved its affricate. Thus, the Late Proto-Finnic shape seems to have been _*ocra_, which was indeed the regular outcome of Early Proto-Finnic _*oćra_ (see Kallio 2007: 233, 241–242). Unfortunately, it is harder to decide the regular outcome of Early Proto-Finnic _*kečrä_, because there is no other example of Early Proto-Finnic _*čr_ and because Early Proto-Finnic _*č_ was subject to a phoneme split into Middle Proto-Finnic _*t_ and _*š_ (> Late Proto-Finnic _*t_ and _*h_). Still, the modern Finnic reflexes of this cluster are the same as those of Late Proto-Finnic _*cr_ and _*str_, namely southern _*tr_, eastern _*sr_, and western _*hr_ (see Map 1 in Viitso 2000).

[10] According to Pekka Sammallahti (1988: 552–554), there was already Proto-Finno-Permic _*rtt_, only occurring in two words, _*kertti-_ 'bind' (cf. Inari Saami _korttâđ_, Udmurt _керттыны_, Komi _кöртавны_) and _*portta_ 'vessel' (cf. North Saami _boarti_, Udmurt _пурты_, Komi _пöрт_). Yet the Saamic and Permic words are more likely separate borrowings from Indo-European, because their vocalism does not match (Koivulehto 1988: 34–37, 41–42). Besides, there seems to have occurred secondary gemination in both Saamic (cf. Proto-Finno-Permic _*ertä_ ~ Pre-Saamic _*erttä_ > North Saami _earti_ 'side') and Permic (cf. Proto-Finno-Permic _*mertä_ ~ Pre-Permic _*merttä_ > Udmurt _мурт_, Komi _морт_ 'man'). Thus, I see no reason to reconstruct Proto-Finno-Permic _*rtt_, but this cluster must rather have arisen independently in the already separate Finno-Permic branches.

[11] For research historical reasons, I keep on speaking of _e_-stem words, even though it looks much more likely that the Early Proto-Finnic stem vowel was either _*I_ or _*Ə_ (see Kallio 2012).

- Proto-Germanic _*sēda-_ (> Old Norse _sáð_) ‘seed’ → Middle Proto-Finnic _*šeeta_ > Finnish _hieta_ ‘fine sand’ (LägLoS 1991: 101).
- Proto-Germanic _*sēman-_ (> Old High German _sāmo_) ‘seed’[12] → Middle Proto-Finnic _*šeema_ > Finnish _hiema_ ‘slight’ (LägLoS 1991: 100).

A recent date is further suggested by the fact that the stem type _*(C)e(e)Ca-_ violates Early Proto-Finnic vowel harmony. Yet both of the examples above were borrowed before the Northwest Germanic development _*ē_ > _*ǣ_ > _*ā_, whereas the following example below was borrowed during it:

- Proto-Germanic _*skēwja-_ (> Gothic _skēwjan_) > Early Northwest Germanic _*skǣwja-_ (> Old Norse _skæva_) ‘go’ → Middle Proto-Finnic _*käve-_ > Finnish _käydä_ ‘go, walk’ (LägLoS 1996: 141–142).

Finally, there are many examples that were borrowed after the Northwest Germanic development _*ē_ > _*ǣ_ > _*ā_:

- Proto-Germanic _*gētja-_ > Northwest Germanic _*gātja-_ (> Old Norse _gæta_) ‘watch’ → Middle Proto-Finnic _*kacco-_ > Finnish _katsoa_ ‘look’ (LägLoS 1996: 59).[13]
- Proto-Germanic _*spēda-_ > Northwest Germanic _*spāda-_ (> Middle High German _spāt_) ‘spar’ → Middle Proto-Finnic _*paati_ > Finnish _paasi_ ‘rock bench, flagstone’ (LägLoS 2012: 5).

Yet even these loanwords were borrowed before the Late Proto-Finnic stage, whose _*tti_ would have been substituted for _*tj_ and whose _*ti_ should have remained as such, as shown by the following examples:

- North Germanic _*flatja-_ (> Old Norse _flet_) ‘floor’ → Late Proto-Finnic _*lattia_ > Finnish _lattia_ ‘floor’ (LägLoS 1996: 176).
- North Germanic _*harðjōʀ_ (> Old Norse _herðar_) ‘shoulders’ → Late Proto-Finnic _*hartia_ > Finnish _hartia_ ‘shoulder’ (LägLoS 1991: 84).

In brief, if these words had been borrowed into Middle Proto-Finnic, their modern Finnish shapes should not be _lattia_ and _hartia_ but _*latsa_ and _*kartsa_, respectively. Even though they must therefore have been borrowed into Late Proto-Finnic, they show no _i/j_-umlaut dating from the mid-first millennium AD onwards (see Schulte 1998 on runic evidence). All this agrees with what was said before that Late Proto-Finnic dates to the Early Runic period (ca. 200–500 AD).

As we already saw above, Middle Proto-Finnic was in turn concurrent with the Northwest Germanic development _*ē_ > _*ǣ_ > _*ā_, whose _terminus ante quem_ was the earliest runic inscriptions of the second century AD (Nielsen 2000: 205–206). On the other hand, its _terminus post quem_ was of course the Proto-Germanic development _*ā_ > _*ō_, whose latest proposed dates to the beginning of our era can be rejected on good grounds (Stifter 2009). Instead, both of the developments were possibly finished well before the beginning of our era (Koivulehto 1999: 14–15).[14]

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[12] Compare also the hypothetical Proto-Germanic adjective _*sēma-_ ‘small or insignificant in quantity or quality’ (Falk & Torp 1909: 434) whose positive, however, is not attested at all but only its comparison forms such as the comparative _*sēmizan-_ > Old Swedish _sǣmbre_ ‘worse’, Old English _sǣmra_ ‘weaker’ (Heidermanns 1993: 477–478).

[13] Early Proto-Saamic _*käćći-_ (> North Saami _geahččat_) ‘look, herd’ looks like a separate borrowing from Early Northwest Germanic _*gǣtja-_ ‘watch’.

Hence, the Middle Proto-Finnic period would roughly have covered both the Pre-Roman Iron Age (ca. 500–1 BC) and the Early Roman Iron Age (ca. 1–200 AD). Interestingly enough, the Germanic loanwords in Finnic have hardly ever been dated to the Pre-Roman Iron Age when Scandinavia no longer influenced Finland as much as it did during the Bronze Age. However, Finnic was also spoken in Estonia, which in fact remained in close contact with Scandinavia throughout the Pre-Roman Iron Age (cf. Kriiska & Tvauri 2007: 117–129; Lang 2007: 255–256, 262–263).

In this respect, the Early Roman Iron Age was totally opposite. The contacts between Scandinavia and Estonia ended, and they both started to strongly influence Finland. Still, all Germanic influence did not necessarily spread from Scandinavia, because Estonia and Finland also had a trade connection with Prussia which was at that time occupied by Pliny's *Gutones* and Tacitus' *Gothones*. However, only a few Germanic loanwords, after all, came from this direction, whereas all the rest came from the west, more precisely from Svealand and Gotland based on archaeological evidence (for which see Salo 2008: 123–167).

Thus, the Northwest Germanic loanwords in Middle Proto-Finnic most likely date to these periods.[15] As the number of the Finnic speakers dramatically decreased during the cold and wet Pre-Roman Iron Age, the number of the Germanic-speaking newcomers did not even need to be particularly significant in order to result in a massive amount of loanwords. In any case, the Early Roman Iron Age reestablished very close contacts between Sweden and Finland, and from this period onwards there has been a continuous stream of loanwords from Germanic into Finnic.

3. Legacy

As I noted above, Finnic has around 500 "early Germanic" loanwords. As standard Finnish has around 6000 word stems (Häkkinen 2004: 6), it is a considerable percentage of the Finnic vocabulary. Moreover, the Germanic loanwords also introduced several new phonotactic features into Proto-Finnic, such as new syllable structures. Most of all, while Early Proto-Finnic had only had monomoraic syllables (i.e. _*(C)V-_) and bimoraic syllables (i.e. _*(C)VV-_, _*(C)VC-_), Late Proto-Finnic also had trimoraic syllables (i.e. _*(C)VVC-_, _*(C)VCC-_).[16] Strangely enough, this particular fact went unnoticed by Lauri Posti (1953), who was, after all, the first scholar to regard Late Proto-Finnic as phonologically Germanicized (see Kallio 2000).

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[14] The dating is also complicated by the fact that different dialects with different vocalism could have coexisted. Consider Late Proto-Finnic **meekka* (> Finnish *miekka*) 'sword', which for phonotactic reasons can hardly go back to Middle Proto-Finnic, even though it reflects Proto-Germanic **ē* (cf. Proto-Germanic **mēkjaz* > Gothic *mēkeis*, Old Norse *mækir* 'sword'). Thus, although Late Proto-Finnic was mainly in contact with the *ā*-dialect(s) of Scandinavia, it also seems to have had a more remote connection with some *ē*-dialect(s) of, say, Prussia.

[15] The same must also be said about the North Baltic and Early (Middle) Slavic loanwords in Middle Proto-Finnic (see Kallio 2006a, 2008), and especially those of the latter that already reflect the First Palatalization (e.g. Finnish *hauki* 'pike' and *hirsi* 'beam') date to AD rather than BC. Therefore, they most likely had something to do with the Early Roman Iron Age trade routes along the Russian rivers connecting the Finnic and Slavic homelands. At least the idea that they could, after all, be borrowings from Baltic where their suggested sources are not even attested (cf. Nieminen 1949; Liukkonen 1999: 40–42; Gliwa 2009: 193–197) must be abandoned for good, because otherwise nothing would stop us to take any Finnic word for a borrowing from some nonexistent Baltic source.

So what can the Germanic loanwords in Finnic tell us about the linguistic map of prehistoric northern Europe? First of all, they totally destroy the theory advocated by some German scholars (e.g. Udolph 1994) that Germanic was spoken nowhere in Scandinavia until the Iron Age (see Koivulehto forthcoming). Second, they similarly disprove the idea still cherished by many Russian scholars (e.g. Napol'skix 1990) that Finnic did not arrive in the East Baltic area until the Iron Age (see Koivulehto 2004). In brief, the Germanic loanwords in Finnic show that both Germanic and Finnic were present in the Baltic Sea region during the Bronze Age.

As for where exactly in the Baltic Sea region the contacts between Germanic and Finnic took place, they can hardly have occurred anywhere outside Finland and Estonia, east of which there seems to have been no significant Germanic superstrate until the eighth century AD, judging from archaeological evidence (Carpelan 2006: 88–89).[17] Even Finland has been excluded from this contact area by Ante and Aslak Aikio (2001), according to whom the Finnic homeland could not have been on both sides of the Gulf of Finland (cf. Kallio 2006b: 17–19). However, there is onomastic evidence for the Finnic presence in South Finland before the Northwest Germanic development _*ē_ > _*ǣ_ > _*ā_, dating to the Pre-Roman Iron Age (ca. 500–1 BC):

- Proto-Germanic _*ēþrō/*ēdrō_ (> Old Swedish _ādher_, Old English _ǣdre_, Old High German _ādra_) 'artery, vein' (cf. Swedish _Ådran_, German _Oder_) → Middle Proto-Finnic _*etra_ > Finnish _Eura_ (Koivulehto 1987: 33–36).
- Proto-Germanic _*kwēmja-_ (> Old Norse _kvæmr_, Old English _(ge)cwēme_, Old High German _(bi)quāmi_) 'accessible' (cf. Swedish _Kymmen_, _Köm_) → Middle Proto-Finnic _*kümi_ > Finnish _Kymi_ (Koivulehto 1987: 36–37).[18]

Note that neither _*etra_ nor _*kümi_ can have been borrowed through Saamic, because the regular Saamic reflex of Indo-European _*Tr_ was not _*tr_ but _*rtt_ (see Koivulehto 1988) and because Saamic had early lost its _*ü_ (see Sammallahti

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[16] After trimoraic syllables had been introduced through Germanic loanwords, they soon further spread to inherited Finnic words through certain phonological developments, such as postvocalic _*je/*ji_ > _*i_ (cf. Kallio 2007: 239–240). Consider the inessive plural of the word for 'pot': since Early Proto-Finnic _**pata-j-sna_ would have been phonotactically impossible, we can only reconstruct Early Proto-Finnic _*pata-j-ï-sna_ > Middle Proto-Finnic _*patojesna_ > Late Proto-Finnic _*paδoissa_ 'in pots'. All this can be compared with the adessive plural of the same word in the light of the new theory on the postpositional origin of the Proto-Finnic _l_-cases: the genitive plural _*pata-j_ + the postposition _*ülnä_ 'on, above, over' would regularly have developed into Early Proto-Finnic _*pata-j-īlna_ > Middle Proto-Finnic _*patojelna_ > Late Proto-Finnic _*paδoilla_ 'on pots' (Aikio & Ylikoski 2007: 33–36).

[17] Also from a linguistic point of view it would be rather far-fetched to locate Germanic any further to the east, not least because of its close relations with Celtic (see e.g. Hyllested 2010).

[18] Even though _kymi_ also occurs as an appellative meaning 'large river', its limited distribution in the Kymi valley suggests that the hydronym was appellativized rather than vice versa.

1998: 181).[19] Thus, we have a reason to think that the Finnic presence in South Finland goes back to the Bronze Age (ca. 1600–500 BC). At least there is no other place where the contacts between Germanic and Finnic could be dated this early on equally good linguistic grounds.

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[19] As a matter of fact, if Proto-Germanic **kwēmja-* had been borrowed as Pre-Saamic **kümi*, it would have developed into Proto-Saamic **këmë*, whose expected Finnic reflex would not have been **kümi* but rather **kemi*. Incidentally, there are two major rivers called *Kemi(joki)*, one in Finnish Lapland and another in Viena Karelia, both of which were relatively recently Saamic-speaking.

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Non-Indo-European root nouns in Germanic: evidence in support of the Agricultural Substrate Hypothesis

1. Introduction

The hybrid origin of the Germanic languages has become a popular object of research in recent scholarship. Germanic by far and by large qualifies as an Indo-European language, sharing most of its morphology and lexicon with related languages elsewhere in Eurasia. With the help of the Comparative Method, these similarities have been isolated and unified into the partial reconstruction of the Indo-European parent language. However, during the course of the twentieth century, it has become increasingly evident that a significant part – by some estimated as much as one third of the Germanic lexicon (cf. Rifkin 2007: 55) – lacks a solid Indo-European background. The question therefore arose where these words come from.

No doubt, part of the non-Indo-European lexicon can be accounted for by internally Germanic derivational processes: any living language, after all, renews itself by coining new terms from already existing roots and suffixes. It is unlikely, however, that all of the purely Germanic words can be explained in this way. It has been argued that many isolated Germanic words could be a residue of an extinct European language – a language that was spoken in prehistoric Europe before the invasion of the Indo-Europeans (cf. Polome 1989). This is the Germanic Substrate Theory. It claims that, when the indigenous Europeans were subdued by Indo-European invaders, they abandoned their language in favor of the immigrant tongue.

The Substrate Theory entails that when the Indo-Europeans settled in the future core of the Germanic linguistic area, they imposed themselves and their language on an indigenous population with very different cultural and linguistic characteristics (cf. recently Rifkin 2007: 57). The original language(s) of this area ultimately disappeared, because its speakers shifted to a form of Indo-European speech, though not without leaving a trace. The language shift did not happen overnight, but was probably completed through a longer period of bilingualism,

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perhaps lasting several generations. As a result, the Indo-European dialect, during its evolution into Proto-Germanic, may have become enriched with various indigenous terms for local plants and animals, geographical phenomena, and cultural practices.

Ever since the discovery of the Indo-European language family, there has been an inkling that Germanic was “blended with a very different idiom” (Jones 1798: 423), mainly because the phonology of Germanic is radically different from what is reconstructed for Proto-Indo-European. The Substrate Theory has nevertheless long been regarded a dubious field of research, not least because hardly any falsifiable results were obtained until the most recent decades. This changes with the development of a methodological innovation induced by the findings of among others Polomé (1986; 1989; 1990), Markey (1988), Hamp (1990), Huld (1990), Salmons (1992; 2004), Kuiper (1995), and Schrijver (1997). These linguists were able to show that non-Indo-European words frequently betray themselves by their non-Indo-European form, or by their irregular correspondence with alleged cognates in other Indo-European languages. In this way, it became possible to isolate non-Indo-European lexemes from the Germanic lexicon in spite of the fact that the source language had vanished well before the start of the historical record.

A showcase example of an important non-Indo-European feature is so-called *a*-prefixation. This feature was discovered by Schrijver (1997), who observed a systematic, but non-Indo-European interchange of initial *a-* versus *zero* in a number of European lexical doublets, cf. 1) OHG *amsala* ‘blackbird’ < **amsl-* : Lat. *merula* < **mesal-*, 2) Gal.Lat. *alauda* ‘lark’ < **alaw-* : OE *lāwerce* < **alaiw-* and 3) OHG *aruz* ‘ore’ < **arud-* : Lat. *raudus* < **raud-*. On the basis of alternations like these, Schrijver concluded that *a-* was a prefix in the language from which these words were borrowed, i.e. a pre-Indo-European substrate, and that the prefixed forms received reduced root vocalism in comparison to the unprefixed forms.

The discovery of this feature was a major step forward in Indo-European linguistics, which a century after the discovery of the *Ausnahmslosigkeit der Lautgesetze* had more or less reached its limits. Expectedly, many more examples of *a*-prefixation will be found in the future. One possible candidate worth mentioning here is the Germanic and Balto-Slavic word for ‘sturgeon’, cf. ON *styrja*, OHG *sturio*, OE *styrgia* < PGm. **sturjan-*, *-jōn-* < **str-i-*: Ru. *osëtr*, SCr. *jèsetra*, Lith. *erškẽtras*[1] < **asetr* / **esetr-*.[2] An etymological connection between these words has of old been suspected (cf. Miklosich 1886: 105; Fick/Falk 1905: 505; Vasmer 1964–1973: 3, 158–9), but the alternation of an initial vowel in Balto-Slavic and *zero* in Germanic has never been given an explanation.

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[1] Lith. *erškẽtras* as well as OPruss. *esketres* are formally more obscure. This can be due to contamination with *erškė́tis* ‘thorn’ (Fraenkel 18; Derksen 2008: 145). The Lith. variant *asẽtras* probably is a Belorusian loanword, so that we largely rely on the Slavic evidence for the original form.

[2] Due to the reshuffling of initial **a* with **e* in the Baltic and Slavic dialects, i.e. the phenomenon referred to as “Rozwadowski’s change” (see Andersen 1996: §5.3.3/4; Derksen 2002; Kortlandt 2002–3), the material is largely inconclusive as to the anlaut. We may consequently reconstruct either **asetr-* or **esetr-*.

Although Schrijver's reduction rule does not seem to apply in this case, there is a high chance that the word originates from a non-Indo-European language.[3]

The Substrate Hypothesis is of great interest not only to linguists, but has also drawn the attention of archaeologists and geneticists who focus on the migrational history of Europe. Obviously, the lexical residue or *substrate* has the potential to shed light on the nature of the interaction between Indo-Europeans and non-Indo-Europeans in that period (cf. Rifkin 2007).

Concretely, the Germanic substrate has previously been associated with Basque, Semitic (Vennemann 1995), and Finno-Ugric (Wiik 2002), but the evidence for these conjectures has so far been non-compelling (Mees 2003: 21). To my mind, the most promising hypothesis regarding the Germanic substrate is the linkage with the introduction of agriculture in North-West Europe. The Neolithic Revolution gradually spread from the Fertile Crescent to Europe through Anatolia and the Balkans between the eighth and the fourth millennium BC, and is strongly associated with the Central European Linear Pottery Culture of ca. 5500–4500 BC. It was argued by Gimbutas (1989) on the basis of archaeological finds that "Old Europe" was culturally and therefore also linguistically homogenous prior to the arrival of the Indo-Europeans. This is in agreement – or at least not in disagreement – with the available linguistic data, namely that traces of the non-Indo-European features such as *a*-prefixation can be found from Greek and Latin in the South to Celtic and Germanic in the North. The geographical distribution of this linguistic feature thus patterns with the gradual spread of agriculture.

It was further shown by Haak (2005) that the earliest European farmers were genetically distinguishable from modern Europeans, suggesting that agriculture was transmitted to European hunter-gatherers by immigrant communities. In this way, the linguistic, archaeological, and genetic evidence seems to pattern with the hypothesis that the Germanic substrate is related to the non-Indo-European layer of words in Greek ("Pelasgian"), and represents the linguistic residue of the first European farmers (Kallio 2003; Schrijver (2007: 21).

The aim of this article is to adduce new evidence in support of the Agricultural Substrate Hypothesis. I will introduce a linguistic marker by which a small group of substrate words can be isolated from the rest of the Germanic lexicon. The resulting corpus of words forms the basis for further analysis. It turns out that some words belonging to this group contain morphological elements that also appear in the layer of Greek substrate words characterized by *a*-prefixation. This is an important argument for the claim that the Germanic substrate and "Pelasgian" are indeed related, as has been argued by Schrijver (2007).

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[3] The word has accordingly been connected with the PIE root $*h_2e\acute{k}$- 'sharp' (cf. Derksen 2008: 145), and it is true that these semantics are a common ichthyonymic *Benennungsmotiv* (cf. E *pike*). Still, the formal and semantic similarities of *asetr with *str are so considerable that it seems unattractive to separate the two from each other.

2. A new substrate marker: root noun inflection

Like in Indo-European, Germanic nouns usually consist of three elements: 1) a root, 2) a suffix, and 3) an ending. The word for 'day', for instance, is reconstructed as PGm. **dag-a-z* in the nominative, and in this case, **dag-* is the root, **-a-* the suffix, and **-z* the ending. Not all nouns conform to this formula, however. A considerable amount of nouns have a root and an ending, but lack a suffix. Referred to as *root nouns*, this type of noun is also part of the Indo-European heritage and occurs abundantly in Greek, Latin, and Sanskrit. In Germanic, however, root nouns are perceived as an archaic category. With only a few exceptions[4], it seems to be either closed or moribund in most attested languages. The evidence nevertheless suggests that at an early stage in the history of Germanic, this class was not closed at all, but indeed open to ancient loanwords. This is substantiated by at least the following cases: 1) **arwīt-* 'pea', 2) **gait-* 'goat', 3) **hnit-* 'nit', 4) **hnut-* 'nut', 5) **edis-* 'lady', and probably also 6) **wisund-* 'bison', as I will try to demonstrate below. While the incorporation of ancient loanwords into the dying class of the root nouns may seem paradoxical at first, it is in fact rather logical when one assumes that the loanwords in the source language did not have a suffix that was recognizable as such to the speakers of Proto-Germanic. The structure of this language is after all likely to have been very different from the Indo-European languages. What I therefore wish to propose here is that root noun inflection can serve as a borrowing (substrate, contact) feature, although it is, in fact, not a feature of the donor language, but of the receiving language itself.

3. PGm. **arwīt-* 'pea'

A demonstrably non-Indo-European word that is inflected as a root noun in Germanic is the word for 'pea'. In the literature, we find two different reconstructions, viz. **arwīt-* and **arwait-* (cf. Bugge 1899: 438; Falk/Torp 1909: 19; Pokorny IEW: 335). This disagreement is a result of the situation in Old High German, which has both *arawīz* and *araweiz*. This doublet is further mirrored by MHG *ar(e)weiz*, *arwīz*, *erbiz* (G *Erbse*), but the other West Germanic forms, OS *erit*, MLG *erwete*, MDu. *a(e)rwete*, Du. *ert* are ambiguous and no longer offer compelling evidence for either **arwīt-* or **arwait-* (except, perhaps, for MDu. *arweete*, which seems to point the latter variant). Theoretically, the formal variation can easily be ascribed to the fact that the word was borrowed from an unknown language (see below), but it is possible, too, that *araweiz* arose due to popular etymology, i.e. as a result of contamination with *(h)weizi* 'wheat' < **hwaitja-*. The form **arwīt-*, at any rate, seems to be the *reconstructio difficilior*; it cannot be explained by recent analogies, and must therefore be old.

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[4] In Old Norse, root noun inflection is secondary in most if not all words ending in *-ǫng*, cf. *rǫng*, pl. *rengr* 'rib in a ship', *spǫng*, pl. *spengr* 'spangle, flake', *stǫng*, pl. *stangir* ~ *stengr* 'pole', *tǫng*, pl. *tangir* ~ *tengr* 'smith's tongs'. Also note the loanword *hǫnk*, pl. *hankar* ~ *henkr* 'coil' << MLG *hank* (De Vries 1962: 281).

That the Germanic word for ‘pea’ was a root noun is demonstrated by the Old Norse plural form _ertr_ with _-r_ < *_-iz_ < *_-es_. It is in fact not attested in the singular in this language, which is not a matter of coincidence, of course, because peas obviously are encountered in large quantities more often than one at a time. The Modern Icelandic singular form _erta_, for instance, is a backformation from the plural _ertur_ (cf. _hneta_ ‘nut’ from _hnetur_ < ON _hnøtr_, _hnetr_). The genitive _ertra_ and the dative _ertrum_ further show that the ending _-r_ was mistakenly taken together with the root, something that is only understandable if the singular was marginal or absent. In Faroese, the plural _ertur_ was reanalyzed as a singular form, which gave rise to the secondary plurals _ertrar_. A vestige of the originally _r_-less stem is found in the genitive plural form _ertna_. The original inflection was preserved in Old Swedish as _ært_, pl. _ærter_, gen. pl. _ærta_.

Etymologically, PGm. *_arwīt-_ belongs to the cluster of Gr. _ἐρέβινθος_, _ὄροβος_ ‘(chick)pea’, Lat. _ervum_ and perhaps also OIr. _orbaind_ pl. ‘kinds of grain’. The reconstruction of an Indo-European proto-form *$h_1 ereg^w o$- (Mallory/Adams 2006: 167) or of a doublet *$erog^w o$- ~ $erog^{wh} o$- (cf. Sturtevant 1911: 212) is beside the point, because the irregular vocalic and consonantal correspondences prove that we are confronted with a non-Indo-European item (Furnée 1972: 98, 231, 273; Brown 1985: 60; Schrijver 1991: 36; Witczak 1996: 175). Likewise, Van Windekens’ proposal to reconstruct the word as *_ereu-_ through a lost Indo-European substrate in which PIE *_u̯_ became *_b_ (1950: 399–400) seems futile. Given the formal irregularities and the fact that the word denotes a crop that reached Europe together with the agricultural revolution, not with the Indo-European expansion, we are clearly dealing with a _Wanderwort_ that ultimately derives from a Near Eastern source. Remains of peas and chickpeas are found in the Fertile Crescent as early as the 8th millennium BC, and genetic evidence suggests that both legumes were domesticated in Southern Turkey and the Levant (Zohary/Hopf 2000: 101–111).

Of all correspondences, Gr. _ἐρέβινθος_ and PGm. *_arwīt-_ seem to form the closest match.[5] The Greek word contains the notoriously Pre-Greek suffix _ινθος_ as in _λαβύρινθος_ ‘labyrinth’, _ἀσάμινθος_ ‘bath tub’, _ὑάκινθος_ ‘hyacinth’ etc. In Germanic, there are hardly any traces of this suffix, but it can no doubt be identified with the element *_īt-_ in *_arwīt-_, as was already suspected by Kuiper (1956: 217ff).[6] Pokorny’s statement that we are dealing with a “bloßes Suffix” (IEW: 335) in Germanic is mistaken. Just so is the idea that *_arwait-_ is a compound of a form *_arawa-_ corresponding to _ὄροβος_ and *_aitōn-_ ‘oat’ (Kluge 1910: s.v. _Erbse_), because this derivation leaves the variant *_arwīt-_ unexplained. I assume that the long *_ī_ of PGm. *_-īt-_ reflects a Pre-Germanic suffix *_-ĩd-_ that developed out of *_ind-_ by nasalization of the vowel. The fact that this suffix *_-ind-_ shows a different _Lautstand_ than its counterpart _*-ind_^{h}- in _ἐρέβινθος_ is not necessarily problematic; it can have many different reasons, such as, for instance, the phonetic peculiarities of a possible intermediate language or simply the irregular way in which sounds are substituted during the process of borrowing. In fact, even within Greek, the interchange of _*d_^{h}- with _*-d-_ and _*-in-_ with _*-ī-_ is well attested. A case that certainly must be mentioned here is the word for 'garlic head', i.e. _γέλγις_, gen. _-ῑδος_, _-ῑθος_ and the closely linked _ἄγλις_, gen. _-ῑθος_ 'id.'. Both variants show an interchange of _δ_ with _θ_. Clear examples of prenasalization[7] are _γάλινθοι_, _γάλιθοι_, _γέλινθοι_, _γέρινθοι_ 'peas', _τερέβινθος_, _τέρμινθος_, _τρέμιθος_ 'turpentine tree' (Kuiper loc. cit.; Beekes 2010: 258, 1469–70). Thus we arrive at a Pre-Greek suffix _*ῑd_$^{(h)}$- or _*ind_$^{(h)}$-.

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[5] Georgian _erevindi_/_erevendi_, Old Georgian _erbindi_, OCS _revitъ_ and probably also Mozarabic _arvanço_ seem to be Greek loanwords (Beekes/Kuiper 1975: 84; Miklosich 1878: 123).

[6] Two other possible instances are OHG _alunt_ ‘whitefish’ < PGm. *_alund-_ and ON _sandr_, OE _sand_, MHG _samt_ ‘sand’ < *_samda-_ ‘sand’. Usually, *_samda-_ is reconstructed as *_samad-_ in view of the corresponding Gr. _ἄμαθος_, _ψάμαθος_, but this form may just as well continue *_sam-n̥dh-_ with a vocalized nasal. I therefore reconstruct the Germanic form as *_samda-_, assuming that it developed out of Pre-Gm. *_sam-ndh-_ by assimilation of the second nasal to the _m_.

Turning back to the Germanic situation, it seems safe to assume that the athematic inflection of PGm. _*arwīt-_ indicates that the _-ind_$^{(h)}$- suffix did not end in a vowel in the source language. The original athematicity of the suffix is in fact not only demonstrated by the Germanic form, but also by athematic substrate words in Greek such as _μέρμις_, _-ῑθος_ 'string', which occurs beside the "nasalized" (Beekes 2010: 932) variant _μέρμινθα_. An even better example of athematic _-ινθ-_ is offered by _ἕλμις_, gen. _ἕλμινθος_ f. 'helminth, intestinal worm'.[8] The Pre-Greek origin of this word is ascertained by the irregular variants gen. _ἕλμιγγος_, nom.pl. _λίμινθες_ (Frisk 1,501), which make attempts at Indo-European etymologies, such as the connection with Skt. _kŕ̥mi-_, Lith. _kirmìs_, OIr. _cruim_ < PIE _*k_^{w}_rm-i-_ and _εἰλέω_ 'to turn', _a priori_ futile (cf. Beekes 2010: 414–5). Also note the already mentioned _γέλγις_ ~ _ἄγλις_.

Parenthetically, the doublet _ἄγλις_ ~ _γέλγις_ represents a key case itself as it combines the _ind(_^{h}_)_- suffix with the equally un-Indo-European _a_-prefix[9] in one single word. It can therefore theoretically be claimed on the basis of this item that the two elements belonged to one and the same language, i.e. Pre-Greek. The ablaut of _ἄγλις_ and _γέλγις_ has been reconstructed as _*a-gl-_ vs reduplicated _*gel-gl-_ (Frisk 1, 295) or _*ge-gl-_ (Beekes 2010: 265). In my view, the alternations can better be settled with the help of Schrijver's rule, which revolves around the idea that prefixed roots have vowel reduction in the root. Assuming that _γέλγις_ developed out of _*γέγλις_ by metathesis, I arrive at a triconsonantal root _*g-g-l-_ (on which now see Kroonen 2012). This root was again combined with the _*-ῑd_$^{(h)}$- suffix, thus _*a-ggl-ῑd_$^{(h)}$- and _*gegl-ῑd_$^{(h)}$-.

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[7] I think that it is wrong to speak of "prenasalization" (Beekes _passim_), because this implies that the nasal was added, while it is more probable that it was lost.

[8] Can there be a link with Du. _elft_ 'larva' < _*alb-it-_, OHG _alba_ 'id.' and Nw. dial. _alme_ 'id.'? The latter two forms are usually derived from PIE _*h_$_2$_elbh-o-_ 'white' (Pokorny IEW: 30–31), but the _m_ of Nw. _alme_ must then be explained from the gen.pl. _*alma_ < _*alfna_.

[9] Cf. Beekes (2010: 265): "Evidently, the variation ἀ- ~ zero or ἀ- ~ γε- cannot be of IE origin."

4. PGm. _*gait-_ 'goat'

The PGm. root noun _*gait-_, cf. ON _geit_ (pl. _geitr_), OE _gāt_, OHG _geiz_, has only one extra-Germanic correspondence, i.e. Lat. _haedus_ 'kid, young goat'. This word is not exactly irregular, but it does seem to contain the conspicuously non-Indo-European phone _*a_; the hypothetical PIE reconstruction **$g^{h}eh_{2}id$- at any rate seems unattractive in view of the bisyllabic root structure, and *$g^{h}h_{2}eid$- is not much better.[10] The non-Indo-European origin is further indicated by its limited geographical distribution and the semantics pointing to a culture familiar with goat-keeping. In spite of common opinion, the Proto-Indo-Europeans probably did not have a word for 'goat'. This follows from the fact that all "Indo-European terms for 'goat' for the most part have areal distributions" (Gamkrelidze/Ivanov 1995: 500). Mallory and Adams (2006: 104) reconstruct five goat words for PIE, viz. _*dig-_, *$b^{h}u\acute{g}$-, *$h_{2}ei\acute{g}$-, *$h_{2}e\acute{g}$- and _*kapr-_[11], but all of these reconstructions, except perhaps *$b^{h}u\acute{g}$-, turn out to be post-PIE regionalisms with roots that defy the rules of PIE phonology.

The root _*dig-_ is primarily based on OE _ticcen_ 'kid' < _*tikkīna-_[12], the Hesychius gloss _δίζα · αἴξ Λάκωνες_ and Arm. _tik_ 'animal skin' (cf. Pokorny IEW: 222). This is a rather poor foundation, because of the marginal attestation in Greek and the non-compelling semantic link with Armenian. A real problem with this etymon is that roots with two voiced stops were not allowed in PIE, which precludes the possibility that _*dig-_ was inherited. Of course, OHG _ziga_ 'goat' could be adduced to prove that the original root was *dig^{h}-, and that the geminate of _ticcen_ developed out of *-g^{h}-n- under Kluge's law.[13] This only makes things worse, however, because the Germanic forms can then no longer be reconciled with Armenian _tik_ and – for what it is worth – the Hesychius gloss. In the end, the only way in which an etymological relation between _*dig-_ and *dig^{h}- can be maintained is to assume that we are dealing with an ancient yet post-PIE loanword.

Gr. _κάπρος_ 'boar', Lat. _caper_ 'billy goat', ON _hafr_, OE _hæfer_ 'id.' < _*kapr-_ is even less likely to have existed in PIE, because it is formally close to but ultimately incompatible with OIr. _gabor_, W _gafr_ id.' < _*gabro-_. Even if one accepts _a_ as a phoneme in the Indo-European proto-language (in spite of the fact that it predominantly occurs in words with a local distribution), an Indo-European origin is doubtful at best, because there is no way to unite _*k_ with _*g_ or _*p_ with _*b_. Again, this un-Indo-European interchange points to a contact word.

Skt. _ajá-_, Lith. _ožỹs_ 'goat' < *$h_{2}e\acute{g}$-(i)o- can hardly be an Indo-European word either (cf. Brown 1985: 175), even though it often features as such in the handbooks. The word itself has a perfectly Indo-European structure, but the non-Indo-European origin still follows from its irregular correlation with the root noun Gr. _αἴξ_ 'goat', Arm. _ayc_ 'id.', Alb. _edh_ 'kid'; given the considerable formal and semantic resemblances, I find it unsatisfactory, at any rate, to detach the two words from each other. An Indo-European etymology is especially unattractive because Gr. _αἴξ_ ‘goat’, Arm. _ayc_ cannot be reconstructed as PIE *_h$_2$eiǵ-_; this would have become **_hayc_ with an initial _h_. The alternative *_h$_2$oiǵ-_ does not work either in view of the vocalism. As a result, we are forced to reconstruct the word as *_aiǵ-_, a form that violates PIE phonology in two different ways: 1) it starts with a vowel and 2) it contains **_a_.

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[10] Griepentrog (1995: 207): "Diese Wurzelstruktur ist jedoch sehr selten."

[11] Notation mine.

[12] For the suffix _*-īna-_, cf. Go. _gaitein_ 'little goat'.

[13] E.g. _*tigō_, _*tikkaz_ < _*d(é)iǵh-ōn_, _*diǵh-n-ós_.

All things considered, there are no indications that *_aǵ(i)-_ and *_aiǵ-_ were of Indo-European origin. I would rather suggest that they represent two independent reflexes of a _Wanderwort_ that sounded like *_ai̯di̯_ or *_aɟ_: the word entered Proto-Greek, Proto-Albanian, and Proto-Armenian as *_aiǵ-_, whereas in Balto-Slavic and Indo-Iranian it turned up as *_aǵ(i)-_. I think that this formal split resulted from dissimilar treatment of the palatal element, which was adopted as *_-iǵ-_ and *_-ǵi-_ respectively. The independent adoption of the word thus seems to reflect an ancient linguistic and geographic separation between a Balkan group consisting of Greek, Albanian, and Armenian, and the more central _satəm_-dialects underlying Balto-Slavic and Indo-Iranian to the North of the Black Sea.

Another item with a questionable Indo-European background is OCS _koza_, Alb. _kedh_ ‘goat’. In spite of the formal and semantic similarities, this word cannot be reconciled with OE _hēcen_, MDu. _hoekijn_ ‘kid’ < *_hōk-īna-_ as is traditionally assumed (thus Pokorny IEW 517–518), because the former presupposes a root *_kaǵ^h-_ (Winter’s law), the latter *_kā$^{(\acute{g})}$-_. But even without the Germanic correspondence, the Slavic word can positively be identified as non-Indo-European, because roots combining a plain and a voiced aspirate stop were forbidden in the proto-language.

It was suggested by Möller (1911: 128) that the source of OCS _koza_ is Semitic *_gadi̯-_ ‘goat’, cf. Arab. _gadyu^n_, Hebr. _g^{e}δī_, Berb. _agayd_. The same etymon, however, was more appropriately linked to **_g^{h}aid-_ by Illich-Svitych (1964: 3), who assumed borrowing at the Proto-Indo-European level. This view was embraced by Levin (1995: 115–9) and the occidentalist Bernal (2006, III: 101–2), the latter arguing that the languages in which it occurs, i.e. Germanic and Latin, were too distant from South-West Asia to have adopted it individually after the disintegration of the Proto-Indo-European unity. To Vennemann, however, exactly this dialectal isolation meant the confirmation of his view that Northern Europe was colonized from the Western Mediterranean by Semit(id)ic sea-farers (e.g. 1995: 90; 2003a: 250–2, 615). Both hypotheses are actually defendable, but Vennemann’s scenario implies that cattle breeding spread to North West Europe through sea-bound colonization along the Atlantic coast, which is contradicted by the archaeological evidence.

On the whole, it seems better to abandon the idea that Semitic served as the direct source language for **_g^{h}aid_. Archaeological and genetic evidence suggests that the goat was first domesticated in the Zagros Mountains as early as ten thousand years ago (cf. Naderi 2008) and the ultimate origin of the word may therefore actually lie well beyond the Proto-Semitic horizon. I am therefore inclined to follow Diakonov’s suggestion (1985: 132) that both Italo-Germanic _*g^{h}aid-_ and PSem. _*gadi̯-_ originate from a third source, which ultimately may be connected to the aforementioned synonyms _*ai̯di̯-_ and _*kā̆ǵ$^{(h)}$-_. In this context, it is important to consider similar words for ‘goat’ and ‘billy goat’ in the Caucasian languages, e.g. Adyge _āča_ ‘he-goat’, Dargwa (Akushi) _ʕeža_ ~ (Chirag) _ʕač:a_ (Witzel 2004: §2.3). Most plausibly, the ‘goat’ word filtered through the old continuum of agricultural and cattle breeding cultures that had expanded into Europe from the East in the millennia preceding the arrival of the Indo-Europeans. It must, at any rate, have been adopted by the Germanic and Italic sub-groups after their settlement into or around these communities.

5. PGm. _*hnit-_ ‘nit’

Another Germanic root noun with an unclear Indo-European etymology is the word for ‘nit’, cf. ON _gnit_, pl. _gnitr_, OE _hnitu_, OHG _niz_. The word occurs only in the European dialects, and the proto-forms evinced by these languages are seriously at odds with each other. The Germanic form points to PIE _*ḱnid-_, a root that possibly also underlies Ru. _gnída_, Latv. _gnĩda_ < _*ḱnid-eh$_2$-_, although the development of _*kn-_ to _*gn-_ is slightly unexpected. Similar, but not identical, is the base of Gr. _κονίς_, -ίδος and Alb. _thëní_ < _*ḱonid-_. Theoretically, it is possible to assume an ablauting root _*ḱon-_ ~ _*ḱn-_ here, but the suffix _*-id_ has no real Indo-European foundation. A non-Indo-European origin is further implied by the more irregular cognates, Arm. _anic_ ‘louse’ < _*h$_2$nid-_, in which a laryngeal suddenly pops up, and MIr. _sned_ ‘nit’ < _*snid-eh$_2$-_ with an initial _s_. Even more strange are Lith. _glìnda_ and Lat. _lēns_, _lendis_ < _*gle/ind-eh$_2$-_, although these forms may have developed from _*gne/indeh$_2$-_ by dissimilation of the first _n_ (Derksen 2008: 169; De Vaan 2008: 334).

All data taken together, it is striking that the word for ‘nit’ in almost every single language displays at least one significant irregularity. These irregularities have often been attributed to folk etymology or taboo mechanisms (cf. Derksen l.c.; Beekes 2010: 747), but they can equally well be interpreted as indications that the word was adopted from a non-Indo-European substrate. Key forms, in this respect, are Lith. _glìnda_ and Lat. _lēns_. Apart from their irregular onset, these variants are especially noticeable because they contain a suffix _*-ind-_, whereas all the other languages have _*-id-_. Since this alternation can positively be linked to the agricultural substrate in Greek (see the discussion on _*arwīt-_), it is possible that the word for ‘nit’, too, belonged to this layer. Its source would then have to be something resembling _*c~ʕ(o)n-ĭd_.[14]

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[14] It is not extremely likely that the original root contained an _l_, because its occurrence seems to be phonetically conditioned: whenever the nasalization of the suffix was retained, as in Latin and Lithuanian, the first nasal was liable to dissimilation.

6. PGm. **hnut-* ‘nut’

A non-Indo-European origin must also be assumed for the Germanic root noun **hnut-* ‘nut’, e.g. ON *hnot*, pl. *hnøtr*, *hnetr*, OE *hnutu*, pl. *hnyte*, OHG *nuz*, pl. *nuzzi*. The word only has correspondences in West Indo-European, viz. Lat. *nux*, *-cis* f. ‘nut (tree)’ < **knuk-*, OIr. *cnú*, gen. *cnó*, W *cneuen*, pl. *cnau* ‘nut’ < **knuH-s*, gen. **knuH-os*. This distribution lends little credibility to the reconstruction of an Indo-European root **knu-* (thus Pokorny IEW: 558–9). Celtic and Germanic isoglosses are *a priori* suspect, because there was no independent Germano-Celtic proto-language; similarities between the two branches can only indicate one of the following three relations: 1) Indo-European archaisms that were coincidentally preserved in Germanic and Celtic only; 2) borrowing from Celtic into Germanic or *vice versa*, and 3) shared contact with a third language. In the case of ‘nut’, it is implausible that it is an Indo-European archaism, because Pre-Gm. **knud-*, Proto-Italic **knuk-*, and Pre-Celt. **knuH-* cannot be unified into a single proto-form. It is theoretically possible to assume secondary suffixation of a root **knu-* in Germanic and Italic, but an athematic **d* suffix cannot be demonstrated for Germanic, at least.[15] It therefore seems more attractive to reconstruct a substrate word. Theoretically, the final Pre-Germanic **d*, the Latin **k*, and possibly the **H* of Pre-Celtic **knuH-* can be reconciled by reconstructing a glottal stop for the source word, i.e. **knuʔ* (Kroonen 2009: 221–2). This glottal stop may have been substituted by the different languages in different ways, resulting in a **d* in Pre-Gm., a **k* in Pre-Italic, and perhaps a laryngeal in Pre-Celtic. The alternative is to compare the Gm. **t* to the one of **arwīt-* and to assume that it reflects the substrate element **-ũd*$^{(h)}$-, a variant of **-ĩd*$^{(h)}$- (cf. Gr. *κολοκύνϑη* ‘round gourd’, *ὀδόλυνϑοι* ‘chick-peas’, *ὄλυνϑος*, *ὄλονϑος* ‘wild fig’ (Beekes 2010: 738, 1046, 1074), but this does not explain the Italic form **knuk-*. Whatever the case may be, the fact that the word emerges as a root noun in Germanic (as well as Latin) is likely to be the result of the vowelless coda of the word in the source language.

7. PGm. **edis-* ~ **dīsi-* ‘lady’

Another root noun with a potentially non-Indo-European origin is **edis-* or **idis-* as continued by OE *idis*, OHG *itis*, OS *idis* ‘woman, lady (of high standing), matron’. The inflection as a root noun is supported by the ending-less dative form *itis* in Old High German (Braune §240) and *idis* in the Old Saxon *Heliand*, which derive from PGm. **edisi* or **idisi*.[16]

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[15] In Old English, there was a productive **t* suffix, cf. OE *frēot* ‘freedom’, *sweofot* ‘sleep’, *þēowet* ‘service’, but this suffix was thematic, started in a vocalic element **e*, **a*, or **u*, and was used only to create abstract nouns from verbs and adjectives.

[16] More circumstantial evidence in favor of a root noun has been adduced in the form of the Middle Dutch feminizing suffix *-nede* as in e.g. *swasenede* ‘sister-in-law’, *graefnede* ‘countess’, *enede* ‘wife’, which Hendrik Kern in a letter to Matthias de Vries derived from an *s*-less form of **idis-* added to *n*-stems such as **grēf(j)an-* ‘boss, count’. Although Kern later retracted his idea, he could not prevent Franck from adopting

Several attempts have been made to give this word an etymology, none of them being generally accepted. In spite of its very limited distribution, the word has been projected back into PIE as a hysterodynamic _s_-stem _*h_1ed^h-ḗs_, pl. _*h_1ed^h-és-es_. This was done by Nedoma and Eichner (2000: 33), who tentatively supposed an etymological correlation with OHG _etar_ 'pale in a fence'. Even more recently, Bammesberger (2007) proposed a link with Skt. _édhas-_ 'firewood' < _*h_2eid^h-os-_ and other formations to the root _*h_2eid^h-_ 'to burn', assuming that the hysterodynamic _s_-stem, which he reconstructed as _*h_2id^h-ḗs_, pl. _*-és-es_, was originally applied in metaphorical sense, like Modern German _Flamme_. These semantic interpretations do not seem self-evident, however.

I would like to stress that there is no compelling reason to think that the word is Indo-European. On the contrary, the non-Indo-European character of the word seems to be betrayed by the internally Germanic correspondence with ON _dís_ f. 'woman, goddess' < _*dīsi-_. Given the close formal and semantic match it would be highly unsatisfactory to deny the etymological link between the two words. But this is precisely what sometimes has been done, because from the Indo-European perspective, the correlation between _*idis-_ and _*dīsi-_ is not fully regular.[17] This incongruity is exactly the point; however, as it may very well indicate that the word was not inherited from the parent language, but rather adopted from a local pre-historic language in Northern Europe.

Not only is the etymological separation of _*edis-_ and _*dīsi-_ artificial on the linguistic side, there are furthermore strong cultural arguments for connecting the two words. In the _First Merseburg Charm_, one of the few glimpses into West Germanic paganism, the _idisi_ act as _valkyries_ that actively interfere with the fate of the combatants during battle. This is in conformity with Old Norse mythology, in which the _dísir_ form a general category of matrons encompassing the _valkyries_, _norns_, and _fylgjur_ (cf. Simek 2004: 84–5). Further proof in favor of these two words being the same was furnished by Jacob Grimm, who in his _Deutsche Mythologie_ (II: 373) pointed at the parallelism of the Eddaic phrase _dís Skjǫldunga_ 'lady of the Shielding clan' with _idis Scildinga_ 'id.' in _Beowulf_.[18]

In view of this telling linguistic and cultural-historic evidence, it seems rather audacious to me to deny an etymological link between _*edis-_ and _*dīsi-_. I am unaware, however, of any Proto-Germanic or Proto-Indo-European morphological process according to which _*edis-_ and _*dīsi-_ could be unified into a single form or paradigm. One could theoretically resort to something as intricate

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it in his _Etymologisch Woordenboek_. Indeed, the _s_-less form can theoretically be explained from _*ediz_ or _*idiz_ with voicing of final _*s_, because the ending _*-z_ was regularly lost in Proto-West Germanic. It still seems more probably, however, that we are dealing with an element _*niþī_ < _*ni-t-ih_2-_ 'related woman', i.e. the feminine form of Go. _niþjis_, ON _niðr_ 'kinsman' < _*ni-t-io-_ (cf. Skt. _nítya-_ 'innate, continuous'). MDu. _enede_ can then easily be explained as _*aiwa-niþī-_ "Ehefrau".

[17] Bammesberger derived _*dīs-i-_ from the PIE root _*d^hei-_ 'to shine', for instance.

[18] It was recently inferred by Nedoma that the syntagm of _dís Skjǫldunga_ was a semantically empty title and therefore cannot be old. I think that this reasoning must be reversed: exactly the fact that _dís Skjǫldunga_ evolved into an epithet proves its old age. Also see the discussion between Frederic Armory and Pat Belanoff (1990).

as an ablauting *_is_-stem[19], e.g. PIE *_h_$_1$_éd_^{h}_-iōs_, gen. *_h_$_1$_d_^{h}_-is-ós_, acc. *_h_$_1$_d_^{h}_-iés-m_ > PGm. *_edjōz_, *_dizaz_, *_djesun_. But even a paradigm like this could probably not account for the long *_ī_ of *_dīsi-_, although, admittedly, I am not entirely sure what the exact outcome of PIE *_h_$_1$_d_^{h}_-ies-m_ would be. It therefore seems worthwhile to consider the possibility that both Germanic formations were adopted from a local language that had two different forms, viz. *_edis_ and *_dīs_. It is, of course, tempting to compare the alternation in this hypothetical language with the process of _a_-prefixation that is found in other non-Indo-European words. One could speculate, for instance, that the *_e_ of *_edis_ is a regional, more fronted vowel variant of *_a_, e.g. *_æ_ or *_e_. The alternation between short and long _i_ in *_edis_ and *_dīs_ could be attributed to the stress: it was claimed by Schrijver that the prefix attracted the accent, resulting in a reduced vocalism in the second syllable, cf. *_arud_ : *_raud_ 'ore'. With this principle, the long _i_ of *_dīs_ can be understood as reflecting stressed _i_ in the donor language.

Possibly, a fronted pronunciation of the phone *_a_ in the pre-Germanic language is corroborated by PGm. *_þeura-_ 'bull' as represented by ON _þjórr_, Du. dial. _duur_. This word has been reconstructed as PIE *_tauro-_ on the basis of e.g. Lat. _taurus_, Gr. _tauros_, Lith. _taũras_, OCS _tur_, Alb. _ter_[20], but in view of the irregular formal relationship with OIr. _tarb_ < *_taruo-_[21], Go. _stiur_, ON _stjórr_, OE _stēor_, OHG _stior_ m. 'bull' < *_steuro-_ and *_þeura-_ itself, there is little point in projecting this word back into the Indo-European proto-language. This would, in fact, only result in an unfortunate increase of the corpus with problematic _a_-vocalism and movable _s_. It is far more plausible that the word ultimately shares its origin with Proto-Semitic *_ṭawr_, cf. Akk. _šūru_, Arab. _twr_ and Hebr. _ṭaur_ 'steer' (Schmidt 1890: 7; Möller 1907: 214; De Vries 1962: 614; Levin 1995: 403–5; Vennemann 1995: 88–89; Mallory/Adams 1997: 135). The dialectal divergence in Europe further proves that the word was not borrowed at the Proto-Indo-European level, but only after the fragmentation into the different daughter languages. The exact source language from which Pre-Germanic borrowed *_þeura-_, whether a Semitic or a third intermediary language, appears to have been characterized by the brightening of *_a_ to *_e_ at least under certain circumstances.

In earlier scholarship, it has been claimed that the *_e_ of *_þeura-_ was introduced secondarily under the influence of *_steura-_ (Pokorny IEW: 1080–5), which is formally compatible with Av. _staora-_ '_Großvieh_'. This solution does not help much, however, because neither *_þeura-_ nor *_steura-_ can in my view be separated from PSem. *_ṭawr_ (and Etr. _thevrumines_ 'Minotaur'). The alternation between *_þ-_ and *_st-_ is usually accounted for by invoking a movable _s_. The point is that the exact origin of this movable _s_ is considered to be obscure. I find it likely, in this particular case, that the different onsets of *_þeur-_ and

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[19] The PIE comparatives were inflected as hysterodynamic _is_-stems, cf. Gr. _ἡδίων_, acc. _ἡδίω_ < *_sueh_$_1$_d-iōs_, *_ios-m_ (with analogical transfer to the _n_-stems).

[20] The _e_-vocalism is due to _Umlaut_ that took place in the Proto-Albanian paradigm *_tar_, pl. *_tarī̆_ (Demiraj 1997: 46). It does not imply *_eu_, as is claimed by Mallory/Adams (2006: 136).

[21] Fi. _tarvas_ is not comparable to the Celtic form, because it metathesized *_-vr-_ to *_-rv-_, cf. _karva_ 'hair' from Lith. _gaũras_ 'id.'

*_steur-_ ultimately represent two different outcomes of the sound that corresponds to *_ṭ_ in Proto-Semitic. The differentiation may have taken place in various ways. It is conceivable, for instance, that a form *_þeur_ was borrowed twice by Germanic, first as *_steur-_ before Grimm's Law when the language did not yet have dental fricatives, and later as *_þeur-_ when it did. Another likely scenario is that the different onsets arose by repeated sound substitution when the _Wanderwort_ passed from one language into another (Schmidt 1890: 7; Uhlenbeck 1896: 136). Finally, the "movable _s_" can be ascribed to a dialectally divergent evolution of the sound corresponding to *_ṭ_ in the source language; the proto-forms with *_t-_ and *_st-_ would then ultimately have been borrowed from different dialects. This is probably supported by the parallelism of PGm. *_steura-_ with Av. _staora-_, which could have been adopted from two opposite sides of the alleged linguistic continuum.

At any rate, the situation is reminiscent of the PIE word for 'star', cf. Hitt. _ḫasterza_, Gr. _ἀστήρ_, Go. _stairno_, Lat. _stella_ etc. < *_h_$_2$_ster-_. In the past, attention has been drawn to the formally and semantically similar Proto-Semitic form *_ᶜaṭtar-_ '(star) goddess, Venus' as evidenced by Akk. _ištar_, Hebr. _ᶜaštōreṭ_, SArab. _ᶜṭtr_. Bomhard (1986) rejected this equation, arguing that the Indo-European word must be derived from the root *_h_$_2$_eh_$_1$_-s-_ 'to burn' (cf. Mallory/Adams 2006: 129; Pinault 2007).[22] But it was argued by Hamp (2000), that a form *_h_$_2$_Hs-ter-_ probably would have given Lat. **_astella_, with vocalization of the second laryngeal, an objection that is generally bypassed by assuming simplification of *_h_$_2$_h_$_1$_ster-_ to *_h_$_2$_ster-_, however. The most important argument against an Indo-European origin then consists of the irregularities displayed by Sanskrit, viz. nom. pl. _tāraḥ_ < *_h_$_2$_tēr-es_, inst. pl. _stṛ̥́bhiḥ_ < *_h_$_2$_str-b_^{h}_is_. Instead of circumventing these irregularities by assuming a movable _s_[23], it is perhaps more efficient to assume that the word itself passed into the Indo-European dialect continuum from an external source, and that the formal problems result from the difficulties in pronouncing the PSem. cluster *_ᶜṭt-_.[24] Gamkrelidze and Ivanov (1995: 592–2) argued that, in the process of borrowing, the PSem. _ayin_ could have been substituted by _h_$_2$, and the _ṭ_ by either _s_ or _zero_ in (disintegrating) Proto-Indo-European (cf. Vennemann 2003a: 357–8; 2003b: 888).[25] The substitution of *_ṭt_ by *_(s)t_ would then be comparable to the development of *_ṭ_ in the words for 'bull'.

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[22] I further have doubts about the adduced semantic parallel of Alb. _(h)yll_ 'star', which Mallory and Adams (2006: 129) take to be derived from the root *_h_$_1$_us-_ 'to burn'. Possible, too, is the connection with PIE *_h_$_2$_eus-_ as in *_h_$_2$_eus-ōs_, *_h_$_2$_us-s-ós_ 'dawn'. The proto-form would then be *_h_$_2$_us-lo-_.

[23] Technically, the _s_ would be an infix in *_h_$_2$_ster-_, because it comes after the laryngeal.

[24] It was claimed by Diakonov (1985: 123) that the meaning 'Venus' developed secondarily in Semitic, and that the word could therefore not have been borrowed into (post-)PIE, where 'star' is the only connotation. But this argument can just as well be reversed: the fact that the meaning 'star goddess' developed in Semitic must mean that it was a native word in this family.

[25] In a footnote (1995: 772), Gamkrelidze and Ivanov contradict themselves when they accept Bomhard's internal Proto-Indo-European derivation from the root *_h_$_2$_Hs-_ 'to burn'.

8. PGm. **wisund-* ‘bison’

Another case that must be considered here is OHG *wisunt*, *-ant*, ON *visundr*, OE *we(o)send* m. ‘bison’. The word is typically inflected as an *a*-stem in Old English, but there are indications in Old High German that it originally was a consonant stem. First, there is the OHG plural form *wisunti*, which with its ending *-i* points to an *i*-stem. Since practically all masculine consonant stems shifted to the *i*-stems in Old High German (Braune 1891: 180), this is, too, likely to have happened in the case of *wisunt*.[26] A second indication that ‘bison’ was originally inflected as a consonant stem consists of the Verner variation that is implied by the proper name *Wirunt*. Of old, it has been claimed that this name is etymologically identical to the appellative, which is not at all implausible in view of the name of the Gothic flag-bearer *Οὐισανδος* mentioned by Procopius. The underlying form **wizund-* implies an accentual alternation within the paradigm. It follows that the athematic reconstruction as given by Fick, Falk, and Torp (1909: 413) and Schaffner (2001: 631–634) is better than the *a*-stem that was reconstructed by e.g. De Vries (1971: 61).

PGm. **wisund-* is generally taken to be of Indo-European origin. It has been connected to e.g. Skt. *viṣā́nā-* f. ‘horn’ (Pettersson 1921: 39), to Lat. *virum* n. ‘stench, slime’, the original meaning allegedly having been “horned one” or “smelly one” respectively (e.g. Mallory/Adams 1997: 136) and to PIE **ues-* ‘to consume’ (Stiles 2004). The reconstruction that one finds in the literature is an *nt*-stem, i.e. **uis-ont-*. This stem was assumed by Schaffner (2001: 633) to be the continuation of a fully ablauting paradigm **uéis-ont*, **uis-nt-ós* by the generalization of the zero grade of the root. Those who prefer an Indo-European origin may find it interesting, however, that the root vowel of ON *visundr* in fact was long. In spite of the dictionaries (e.g. Hægstad 1930; De Vries 1962; Zoëga 1910), which cite the form with *ĭ*, MoIcel. *vísundur* clearly shows that the Old Norse vocalism was **í*. This means that, if one ignores the probability that *vísundr* was borrowed from Low German (thus De Vries 1962: 669), the Germanic forms can be accounted for by deriving them from an ablauting paradigm **wīsand*, **wizundaz* < **uéis-ont*, **uis-nt-ós*.

Yet however elegant the reconstruction **uéis-ont*, **uis-nt-ós* may seem from the Germanic perspective, it loses its validity as soon as the Balto-Slavic evidence is taken into consideration, viz. OPruss. *wissambs’*[27], Lith. *stumbras*, Latv. *sumbrs*, *sūbrs*, OCS, *zǫbrъ*. The formal differences of these forms with the Germanic word have been reason to deny any etymological link between Balto-Slavic and Germanic, but the similarities, especially those with OPruss. *wissambs’*, are too considerable to accept such a separation. The divergence between the two branches nevertheless remains problematic, because there is no single proto-form that can explain the entire set of forms. In fact, when one takes a closer look at the other Balto-Slavic correspondences, it becomes clear that the word is not only lacking a solid Indo-European form, but that even within this branch, several irreconcilable proto-forms must be reconstructed in order to account for the material: OCS, _zǫbrъ_ goes back to PBSl. *_źambras/źambris_. It can be unified with the second element of OPruss. _wissambs'_, which seems to go back to *_viźamb(r)as_[28], but not with the Baltic correspondences, where the expected outcome would have been Lith. **_žambras_, Latv. **_zuobrs_. The attested forms, Lith. _stum̃ bras_, Latv. _sumbrs_ rather presuppose PBSl. *_s(t)umbras_ or rather to *_s(t)ambras_ with the Eastern Aukstatian development _-aN-_ > *_-uN-_.

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[26] Such a scenario is further supported by the dative plural forms *wisuntun*, *wisintun*. With the ending *-un*, they fit into the paradigm of either the *a*-stems or the consonant stems, but not the *i*-stems, where the ending is *-im*. The inflectional type of *wisunt* is, in other words, comparable to the one of the original root noun *fuoz* ‘foot’, which in the nom. pl. appears as *fuozi* and in the dative as both *fuozim* and *fuazzum*, *fuozun* (cf. Braune 1891: §229).

[27] It is found in this form in the Elbing Vocabulary. I will refrain from the question of whether or not this form should be emended to **wissambris*, as was done by Trautmann (1910).

Obviously, the four different proto-forms *_źambras_, *_viźamb(r)as_ and *_s(t)ambras_ cannot be reconciled with each other, let alone with PGm. *_wisund-_. In spite of this, some have projected the form *_źambras_ back into PIE as *_ǵ$^{(h)}$omb^{h}-ro-_ (cf. Mallory/Adams 1997: 136), and derived it from the PIE root *_ǵomb^{h}-_ 'jag, tooth' (cf. recently Schütz 1997: 97). OPruss. _wissambs'_ has even been explained as a contamination of this *_źambras_ with the Germanic word (Petersson 1921: 40). Both approaches seem futile, however, because they still do not offer an explanation for the East Baltic words. It is of course possible to assume that the initial _st-_ of Lith. _stum̃bras_ is analogical after _stémbti_ 'to be stubborn, buck' (Buga 1912: 45), or that the dissimilarities are unproblematic because "such phonetic transformations of cultically significant words are frequent among the names of animals" (Gamkrelidze/Ivanov 1995: 440). One might even assume that the correspondence Lith. _st_ ~ Sl. _z_ is indicative of the Indo-European reflex of the alleged Nostratic phoneme *_č́_ (Ivanov 1975). But, to my mind, it is more economical in this particular case, to abandon the idea that the word was inherited from Proto-Indo-European, especially in view of Caucasian correspondences such as Ossetic, Adygh, Georgian _dombaj_, Abkhaz _a-dəwp-èy_ 'aurochs' (cf. Ivanov 1975; Gamkrelidze/Ivanov 1995: 440; Abaev 1996: 206).[29] It rather seems that the word penetrated into Germanic and Balto-Slavic separately, when they had already settled in Western and Central Europe. Given the homogeneity of the Germanic material as opposed to the dialectal variation in Balto-Slavic, this must have happened _before_ the disintegration of Proto-Germanic, but _after_ the splitting-up of Proto-Balto-Slavic, i.e. somewhere in the middle of the first millennium BC.

The form of the non-Indo-European word can be approximated by approaching it top-down. Comparison of the different forms shows that the original coda can safely be reconstructed as *_-ombr_ for Balto-Slavic. This element was borrowed into Slavic as *_ombr_ > *_-ǫbr_, because PBSl. *_a_ had already changed into PSl. *_o_ at that time, but as *_umbr_ in Baltic, because the only vowels occurring before _-mb-_ were *_a_ and *_u_ in this language. The same argument goes for Germanic: since this language did not have a short _o_, only *_u_ and *_a_, the original vocalism can have been *_o_, too. The Germanic coda, however, clearly points to *_-nd_.

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[28] For the *_ss_ from *_ź_ cf. _assaran_ 'lake' = Lith. _ẽžeras_.

[29] Derksen (2008: 549): "A connection with the root *_ǵomb^{h}-_ of PSl. *_zǫbъ_, Latv. _zùobs_ 'tooth' cannot be ruled out, but it is possible that we are dealing with a migratory term, cf. Osset. _dombaj_ 'bison'."

For the onset there are a number of possibilities, but the most plausible options are *_ts_- or *_ʧ_- for Baltic and Germanic, and *_dz_- or *_ʤ_- for Slavic.[30] In spite of Lith. _stumbras_, *_st_- is out of the question, because this cluster would have remained in both Germanic and Slavic.[31] It seems more apt to start from a cluster in which the dental element _preceded_ the sibilant, viz. *_ts_-. This is in accordance with the evidence that PBSl. *_ź_ < *_ǵ/ǵ_^{h} was pronounced [dz] or [ʤ] in early Slavic, as it still is before _v_ in e.g. Mac. _dzver_, Ukr. _(d)zvir_ 'animal' < *_ǵ_^{h}_uēr-_ (Kortlandt 1980: 250; 2008: 5). I therefore assume that PSl. *_zǫbrъ/ь_ entered Slavic as *_dzombr_ or *_ʤombr_. The Baltic forms can be explained by starting from a voiceless variant of the same form, viz. *_tsombr_ or *_ʧombr_. Since this *_ts_ emerges in metathesized form in Lith. _stumbras_ and not as _š_ or _č_, it seems plausible to assume that it entered the language at a time when there was no *_ts_ or *_ʧ_ with which to substitute it. This was the case in the considerable period between the simplification of *_tš_ (< PBSl. *_ć_ < PIE *_ḱ_) to _š_ and the late affrication of *_ti̯_ to _č_ (cf. _ãntis_ 'face', gen. _ãnčio_).

The derivation of OCS _zǫbrъ_ and Lith. _stum̃bras_ from Pre-Balto-Slavic *_dzombr_ or *_tsombr_ leaves us with the first element of OPru. _wissambs'_ and PGm. *_wisund-z_. I have already stated that I do not like the idea that _wissambs'_ is due to contamination of *_žambras_ with PGm. *_wisund-z_. This is unlikely for several different reasons, the most important being that the element *_wis_- has a strange reminiscence in Ru. _iz'ubr'_ 'red deer, _Cervus elaphus xanthopygus_'. This form ostensibly continues a PBSl. variant *_iźambris_ if not simply *_viźambris_ through some kind of dialectal development. Either way, it represents the missing link between OCS _zǫbrъ_ and OPruss. _wissambs'_, which means that the element *_wi_- must be old. I therefore reconstruct the additional variants *_widzomb(r)_ for Old Prussian and *_witsond_ for Germanic.

The variation of *_tsombr_, *_dzombr_, on the one hand, and *_widzombr_, *_witsond_, on the other, does not hark back to any known Indo-European process, and cannot be explained away by secondary developments in Baltic, Slavic, and Germanic either. It is therefore likely to originate from an external source. I surmise that it is a reflection of a morphological or derivational process in an extinct North-European language. We could speculate, for instance, that this language had a prefix that could be added to the element *_dzombr_ or *_tsombr_ under certain circumstances. It seems an impossible task to establish the original function of this hypothetical prefix *_wi_- in the now disappeared source language, because it can have been so many things such as a definite article or some kind of classifier.

The *_wi_- prefix has a potential parallel, however, in the notoriously non-Indo-European word for 'wild boar', which emerges in three similar but irreconcilable shapes, viz. cf. Lat. _aper_ < *_apr_, OE _eofor_, OHG _ebur_ < *_epr_ and OCS

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[30] Alternatively, Causasian _dombaj_ could point to *_đomb_-.

[31] The assumption that the _t_ is secondary due to contamination with _taũras_ 'bison' or _stem̃bti_ 'to bump' (cf. Fraenkel 932) is _ad hoc_.

veprь, Latv. _vepris_ < *_wepr_.[32] The initial _w_ in Balto-Slavic has been explained as a hiatus-filler (Pedersen 1905: 311–2) or as analogical after Lith. _ver̃šis_ 'calf' (Kent 1926: 185). More recently, Gamkrelidze and Ivanov (1995: 434–5) have attempted to merge the word with the *_kapros_-cluster by reconstructing it as PIE *q^h_wep-_, assuming that the combination of the (idiosyncratic) post-velar *q^h with a labial glide explains the anomalous correspondences of root vocalism in various dialects. Alternatively, the interchange of initial *_w_ with zero can tentatively be compared with the one of *_dzombr_ and *_widzombr_.[33]

A final issue consists of the different _Auslauts_ in Balto-Slavic and Germanic, the former consisting of the labial cluster *_-mb_, the latter of the purely dental sequence *_-nd_. This difference has been an important reason to separate the two words from each other. But this objection is really beside the point if we are dealing with a non-Indo-European word, of course. Theoretically, the two variants *_(wi-)tsomb(r)_ and *_wi-tsond_ can be reconciled by reconstructing a labio-dental cluster, so as to arrive at *_(wi-)tsomd_. There possibilities are legion, however, and I have chosen to refrain from any speculative reconstructions here. Suffice it to say that there are similar alternations in Greek words of non-Indo-European origin, cf. _κορίαμβλον_ ~ _κορίανδρον_ 'coriander', _σάμβαλον_ ~ _σάνδαλον_ 'sandal' and perhaps also _σίδη_ ~ _σίβδη_ ~ _ξίμβαι_ 'pomegranate' (cf. Beekes 2010: 754, 1305, 1329).

9. Summary and Outlook

The words treated above reveal that, in Germanic, the Indo-European class of the root nouns was open to loanwords or substrate words. This can hardly be anything else but a reflection of the form of these words in the donor language; apparently, these words did not have a vocalic coda when they were adopted. The resulting collection of non-Indo-European root nouns is informative of the nature of the Germanic substrate. The fact that "Neolithic" words, such as *_gait-_ 'goat' and *_arwīt-_ 'pea' are overrepresented contradicts the idea that the Indo-Europeans were a deeply agricultural people (contra Renfrew 1987, 2001; Lehmann 2002).

In fact, at least a part of the data rather supports the Agricultural Substrate Hypothesis, which revolves around the idea that the Indo-Europeans, after their emigration from the homeland, settled among Neolithic cultures in Europe, and adopted agricultural terms from a continuum of possibly related non-Indo-European languages. An important linguistic argument for the linguistic unity of the European agricultural substrate is provided by the same *_arwīt-_ 'pea', which shares the element *_-īt-_ with the Pre-Greek substrate suffix *_-ĭd-_. The element further co-occurs with the equally non-Indo-European _a_-prefixation in the Greek doublet *ἄγλις* ~ *γέλγις* ‘garlic’ < **a-ggl-ῑd-*, **gegl-ῑd-*. This may be an additional indication that the Germanic and Greek substrate were indeed related, as has been claimed by Kallio (2003) and Schrijver (2007).

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[32] Also note that again the Northern languages have *_e_ whereas Latin has *_a_. It is fully parallel, in other words, to PGm. *_þeura-_ vs Lat. _taurus_ 'bull'.

[33] And what to think of Gaul. _uisumarus_ 'clover' vs. OIr. _seamar_ f. 'id.' < *_semmar-_ and Icel. _smæra_ f. 'id.' < *_smēr-_/*_smair-_?

The linguistic evidence is in corroboration with some interpretations of the genetic prehistory of Europe in relation to the arrival of agriculture. Recent studies have shown that the Neolithization of Europe was not a purely cultural process, but at least partly resulted from “demic diffusion”. DNA samples obtained from Linear Pottery Culture sites confirm that Mesolithic hunter-gatherers and the earliest Neolithic farmers had different origins, and that the latter group “shares an affinity with modern-day Near East and Anatolia populations” (Haas et al. 2010). The spread of agriculture into Europe has further been linked to the microsatellite variance of the male DNA marker haplogroup R1b1b2 (Balaresque et al. 2010). The haplogroup is very common along the Atlantic coast, and has therefore been associated with the European post-glacial hunter-gatherer population. However, since the microsatellite variance within this haplogroup is maximal in West Anatolia, this has been interpreted by Balaresque et al. as the result of a severe founder effect. The distribution of haplogroup R1b1b2 has thus become geographically and linguistically compatible with the Agricultural Substrate Hypothesis that is evident for Greek as well as Germanic.

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The prehistoric context of the oldest contacts between Baltic and Finnic languages

Dating and locating the ancient contacts between Baltic and Finnic is a crucial question when searching for the origins of the Finnic languages. Evidence gained from linguistic palaeontology seems to place Proto-Uralic in the Volga-Kama Basin, some 2000 kilometres east of the Baltic, in a region where the Uralic Mari and Udmurt languages are still spoken today (see Toivonen 1952 for a well-detailed study of the field and Häkkinen 2009 for a somewhat revised view). However, there is no clear linguistic or archaeological evidence to tell us when Proto-Uralic broke down into its different daughter languages and when one of these, Proto-Finnic, had left this eastern area and spread to the shores of the Baltic Sea. In order to reconstruct the process and its different stages we require information that can be provided by the Baltic loanwords.

As the Baltic loanwords are not attested in the more eastern Uralic branches, with the exception of a relatively few lexical items in Mordvinic (cf. van Pareren 2008 and Grünthal, this volume, for a recent detailed overview of the question), we must assume that the contacts took place when Finnic already was an independent branch within the Uralic language family or was at least in the process of breaking off. The contacts cannot be located far away from where the Baltic languages are or have been spoken. The area in which the Baltic languages were spoken was prehistorically much wider than it is today, since the major hydronyms of a vast area between Moscow and the mouth of the Vistula are of Baltic origin (Toporov – Trubačev 1962). The Volga-Kama Basin lies still too far east to be included in a list of possible contact locations. Instead, we could look for the contact area somewhere between Estonia in the west and the surroundings of Moscow in the east, a zone with evidence of Uralic settlement in the north and Baltic on the south side. Since present-day Finland lies quite far away from this zone, the discussion regarding the areal dimension of the contacts has concentrated on whether to include Finland in the contact area or not, and this question has chronological implications. There have been two main concurrent hypotheses concerning the assumed contacts in the territory of present-day Finland, firstly, the alleged migration of the Finnish settlement and, secondly, its continuity on the northern side of the Gulf of Finland. In addition, some other models have also been proposed. Here we shall discuss these theories and their strong and weak points.

A Linguistic Map of Prehistoric Northern Europe.
Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 261–296.

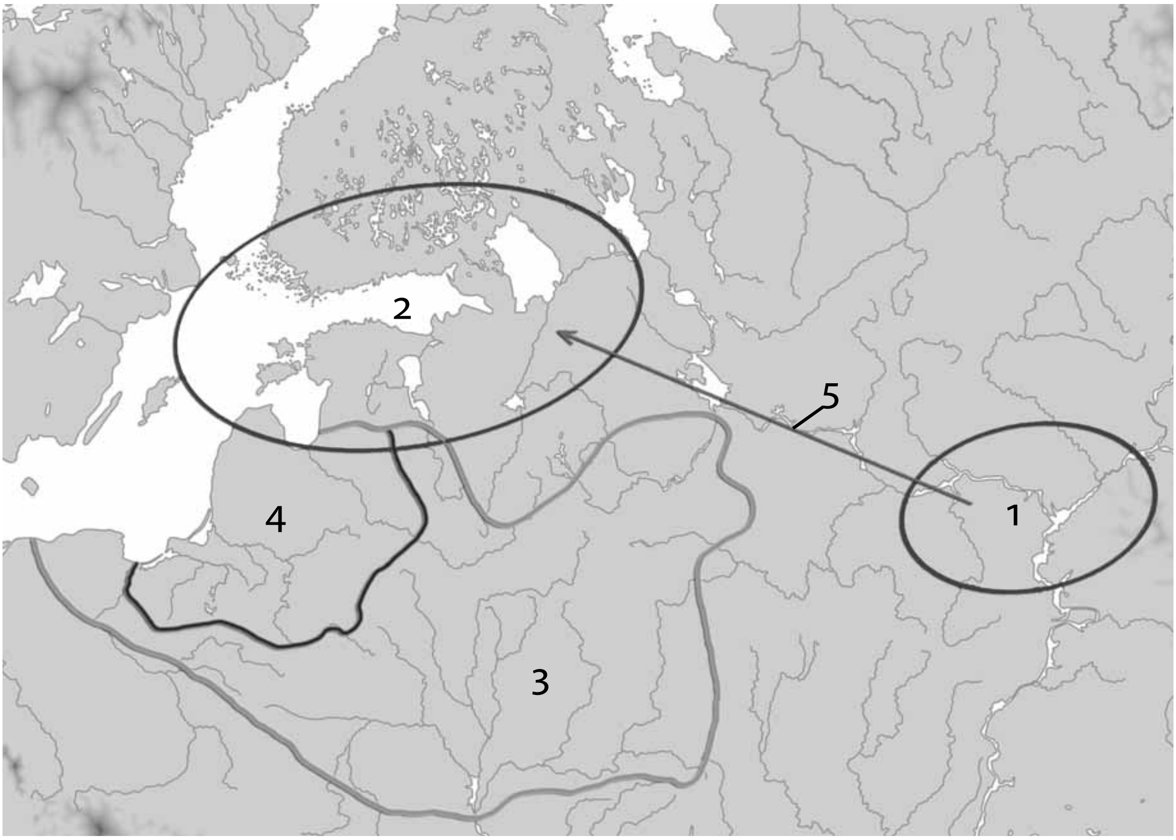

Figure 1. Prehistoric Balts as the southern neighbours of Proto-Finnic speakers. 1 = The approximated area of Proto-Uralic. 2 = The approximated area of Finnic during the Iron Age. 3 = The area of ancient Baltic hydronyms. 4 = The area of Baltic languages in about 1200 AD. 5 = The problem: When did Uralic expand westwards and when did it meet Baltic?

The migration theory

The migration theory argues that the Proto-Finns arrived at the shores of the Baltic Sea in the Iron Age (cf. also the introduction in this book). Accordingly, the Baltic–Finnic contacts took place somewhere east of present-day Estonia, when the Proto-Finns were still moving westwards. After that, Proto-Finnic split, and the future Finns moved to Finland, either from the east, or from the south over the Gulf of Finland, or both. The large stock of Baltic loanwords indicates very intensive contacts. This hypothesis was first suggested by Vilhelm Thomsen in his *magnum opus* on the question, *Beröringer mellem finske og baltiske Sprog* (1890), which still remains the most extensive study on the subject.

The idea of a Finnic migration into Finland in the Iron Age is much older than Thomsen. It had been presented already by Henrik Gabriel Porthan (1859: 46), the initiator of the research into the history of Finland, who actively developed his ideas by adopting an interdisciplinary approach. The idea was probably based on a general conception of the Migration Period as a chaotic era that gave birth to the European nations. Thomsen (1890: 151) still connected the movements of the Finnic peoples with the Slavic migrations northward from about the 8th century, and thus estimated the time of Baltic–Finnic contacts at just a couple of centuries before them, between 0 and 500 AD. According to Thomsen, the Baltic–Finnic contacts would have had to begin before the contacts between Finnic and Germanic, since the Germanic loanwords have not gone through all the same Finnic phonetic changes.

In 1905, Finnish archaeologist Alfred Hackman modified Thomsen's theory based on the archaeological data that had rapidly increased in the meantime. Hackman (1905: 353) claimed an earlier migration of Finns over the sea from Estonia from at least the 4th century on, since the material culture of that period seemed to originate from south of the Gulf of Finland. On this basis, Emil Nestor Setälä (1916: 499–500), the professor of Finnish language who imported the Thomsenian method to Finno-Ugrian studies, assumed that the beginning of Baltic–Finnic contacts took place in the last centuries BC.

The continuation theory

The continuation theory was presented in Estonian archaeologist Harri Moora's works (1952, 1956, 1958). Moora insisted that Proto-Finns had inhabited the Baltic Sea shores since at least the Neolithic period. The Baltic–Finnic contacts took place when the local Neolithic Combed Ware culture, claimed to be Uralic, met the intrusive Indo-European Battle Axe culture arriving in Estonia and Finland. Moora dated the Battle Axe culture between 2000 and 1800 BC, and proposed that the contacts with Germanic began in the Bronze Age with influence from Scandinavia.

The continuationists claimed a lack of evidence of either any mass migration over the Gulf of Finland or any migration later than the Neolithic period to the Baltic area from the east. This view gained support when Carl Fredrik Meinander (1969), based on new findings in Finland, pointed out that there was continuity from the Finnish Bronze Age to the Iron Age. The similarities between the Iron Age material from Finland and Estonia could be explained as a result of simultaneous Scandinavian influence. Moreover, the Baltic loanwords seem to indicate a level of culture that is clearly lower than that of the Iron Age. This fact was transmitted by the 19th century researchers simply by assuming a Stone Age cultural level for all the Uralic peoples until the Migration Period, a prejudice soon disproved by archaeology.

Looking for a third option

The reason for such a huge divergence between the two approaches lies in the lack of any traces of Baltic influence in Finland after the Neolithic spread of the Battle Axe culture. Either the Battle Axe culture has to be combined with a Baltic language, or a Finnic tongue must have spread later to Finland from the vicinity of the Baltic peoples. A third alternative is to explain the prehistoric role of the Gulf of Finland more as a route of communication than as a barrier, as some Finnish linguists and archaeologists have done since Terho Itkonen first proposed it in 1972. Itkonen (1978, 1983) opposed both too-recent Iron Age and too-distant Stone Age datings for Proto-Finnic, as these were incompatible with linguistic data.

On the other hand, the early existence of a Finnic language on the south side of the Gulf of Finland and a pre-Iron Age dating for the Baltic–Finnic contacts there do not conflict with the supposed Iron Age migration of the Finns. These ideas, presented by Moora as early as 1932, were simply not interesting enough for the contemporary Finnish researchers before Meinander combined them with the idea of a continuation of settlement on the Finnish side. Moora combined the Baltic–Finnic contacts with a burial type spreading from East Prussia in the late Bronze Age. Swedish linguist Karl Bernhard Wiklund complemented this Bronze Age model with his theory on the prehistory of the Saami (Wiklund 1947). According to Wiklund, the proposed language shift from a non-Uralic Pre-Saami to the Uralic Proto-Saami took place through contact with the Proto-Finnic culture during migrations caused by an overall climate cooling during the Bronze Age. Thus the Baltic loanwords shared with Saami must be older (cf. also Aikio's article in this book).

Moora's Bronze Age theory was later refuted by Moora himself (Moora 1956: 75–80), since the burial type in question proved to have spread not from East Prussia but from Scandinavia. Another kind of Bronze Age dating is provided by Alfred Senn (1943, 1951) and Kustaa Vilkuna (1948: 283), who proposed that the Baltic languages had spread from the east to the present-day Baltic States where the Finnic languages were already spoken. This hypothesis is based on a supposed Finnic origin of several toponyms in Lithuania and East Prussia, claimed by i.e. Rozwadowski (1913: 61–61, 66–67), a conception that is highly improbable though still gaining support in Lithuania and Poland.

The first plausible attempt to adjust the relative chronology of Uralic linguistics to the discoveries of modern archaeology, free from supposing lengthy continuation periods without any recognisable development in languages, was made by the Finnish archaeologist Ville Luho in 1968. Luho combined the arrival of Proto-Finnic with the eastern contacts of the Bronze Age Textile Ceramics of Finland (and lesser extent, Estonia). Luho's model seems to fit well with the ideas expressed by Terho Itkonen.

Recent discussion on the topic

The loanword studies of Finnish Germanicist Jorma Koivulehto since the 1970s have proved long-lasting contacts between Finnic and Germanic lasting from Pre-Germanic to the present. The oldest Germanic loanwords seem to have gone through all the same phonetic changes as the Baltic ones have. Thus it is no longer correct to assume that the Baltic–Finnic contacts would have begun earlier than the Germanic–Finnic ones. (Cf. Koivulehto 1997 for further details.)

The migration theory has very little support today, since there are no changes in the archaeological material, which are considered radical enough to prove a migration into Finland (Salo 1984). The strongest argument to exclude Finland from the contact area is still valid: there are no unambiguous traces of a Baltic population in Finland, neither in archaeological findings nor in toponymy. Moreover, Moora's continuation theory was based on uncalibrated radiocarbon dates proven to be much too recent, since the calibrating methods have developed to become more accurate.

Moora's model found support from Finnish archaeologists between the 1970s and the 1990s, but all the attempts to adjust it into the relative chronologies of Uralic and Indo-European resulted in controversies. The only linguistically well-grounded version of the Stone Age continuation theory was presented by Mikko Korhonen in 1976. Its validity, however, became heavily threatened when Koivulehto 1983a-b proved the existence of a Late Proto-Indo-European or Pre-Baltic loanword layer in Saami, Finnic, and Mordvinic. Since this layer must precede the Baltic one and it was presumably acquired in the Baltic Sea region, Koivulehto posited it on the horizon of the Battle Axe period. This forces a later dating for the Baltic–Finnic contacts.

Today the Battle Axe culture is dated at 3200 to 3000 BC, a period far too remote to correspond linguistically with Proto-Baltic (Kallio 1998a). Petri Kallio (2006) combines the arrival of Uralic in the Baltic area with the Seyma-Turbino phenomenon, a Bronze Age trading network dated to about 1900 BC. Kallio (2008) insists that the Baltic–Finnic contacts lasted over a millennium in the Bronze Age, on both the northern and southern shores of the Gulf of Finland, in spite of the lack of toponymic support. Thus the contacts need not have been as intensive as it was previously thought.

Since the Baltic contacts began at a very initial phase of Proto-Finnic, the language must have been relatively uniform at that time. Hence, if we consider that the layer of Baltic loanwords may have spread over the Gulf of Finland at that time, we could also insist that the whole of the Proto-Finnic language did so. The distribution of the Baltic loanword stock in the Finnic languages would be explained, if this kind of language diffusion had occurred after the Baltic–Finnic contacts. The Seyma-Turbino phenomenon, or the eastern contacts of Textile Ceramics, may explain the spread of a Uralic language up to Finland and Estonia, but a Finnic language may later have infiltrated into Finland without a mass migration, replacing the earlier Uralic tongue spoken there.

There is, though, one open question not easily combined with this kind of model: the most plausible candidate for a Pre-Finnic Uralic language of Finland is Proto-Saami, but Saami may possess some Baltic loanwords not existing in Finnic, as claimed by Sammallahti 1977: 123 and 1984: 139. However, these stems are very few and may as well be explained by lexical loss in Finnic.

Since Thomsen, there have been several attempts to uncover chronological layers among the Baltic borrowings in Finnic. The most promising phonological criterion has been proposed by Koivulehto (1990: 152): the Baltic **ā* and **ē* yielded Finnic **a* and **ä* in the loanwords gained before the Proto-Finnic non-narrow long vowels had emerged, but Finnic **oo* and **ee* in later loans.

Later, scholars have also discussed the possibility of geographically restricted strata of Baltic loanwords, so-called separate borrowings in northern and southern Finnic. This idea was suggested by Sammallahti (1977: 123) and studied by Seppo Suhonen and Lembit Vaba, both having published a survey of the Finnic distribution of each Baltic loanword (Suhonen 1988 and Vaba 1990b). However, mere distribution is never proof of the separate origin of a loanword, since any word may have disappeared from any dialect or language. The distribution should be compared to phonological substitution patterns.

The role of loanword semantics in dating the contacts

Since a migration is no longer seen as prerequisite for the spread of language, the very existence of a Finnic language in Finland before the Iron Age remains disputed. More importance should be placed on the semantics of loanwords when dating prehistoric language changes.

Borrowings mainly indicate a certain cultural level of the time of contact, since new words, among them words denoting innovations, are much more likely to spread from one language to another than old ones. The more loanwords there are in a specific field, the higher their indicative value: e.g. the oldest terminology for wooden constructions in Finnic languages is mostly of Baltic origin. Even more accurate information may be acquired by asking which innovations the language-speaking community must have been familiar with during the contact period.

Thomsen (1890: 152) concluded that hardly any of the Baltic loanwords contradict the assumption that the contacts began during the Stone Age – e.g. Finnic *kirves* ‘axe’ could initially have been used for the stone axe – though none of these loanwords speak in favour of it either. The latter is actually a superfluous if not even misleading addition, since no loanword, based on its meaning alone, can be dated to an age at least as old as a given date or era. In other words, semantics may never define a *terminus ante quem*. This restriction, excellently formulated by Cowgill (2012: 66–68), was already realized by Setälä (1891: 460).

On the contrary, it should be possible to define a *terminus post quem* of the contacts based on the semantics of the borrowings, if they include any words denoting innovations. Kalima (1936: 199), for instance, opposes Thomsen, expressing from a linguist's point of view that a Stone Age dating for the Baltic–Finnic contacts seems improbable, since it would be too difficult to use a stone axe to carve the constructions denoted by *seinä* 'wall', *silta* 'bridge; floor', *pirtti* 'a small wooden hut for living, bathing or both', *aitta* 'granary', and *orsi* 'perch, beam'.

In other words, we cannot actually say anything about the beginning of the contacts on the basis of semantics only. Instead, the *terminus post quem* of the final phase of the contacts can be defined by looking for the most recent innovation indicated by the borrowings. We just have to keep in mind that the meanings of the words are not stable, but rather keep changing just as any other part of the language changes as a system.

For example, Finnish *hirsi* 'log' (cf. B59 below) may be a Baltic loanword, but that does not implicate that the Finnic peoples would have learnt the building of log houses when borrowing the word, since its possible Lithuanian equivalent *žardas* denotes 'a grate for drying flax'; the former meaning may have been 'wattle' or 'a branch used in weaving a wattle', a meaning which has survived in some Estonian dialects. As a construction technique, wattle and daub is certainly much more ancient than log building.

Words denoting innovations

It would require an uncommon kind of co-operation, activating specialists in linguistics, archaeology, and all other disciplines studying prehistory to find and define the most recent layer of innovations indicated by the Baltic loanwords in Finnic. To start with, in this article we have identified and grouped below all suggested Baltic etymologies for Finnic words possibly datable by means of research into the physical world. Not all *Kulturwörter* have been listed: all toponyms, ethnonyms, and the relatively well-represented words denoting family members and mythological creatures have been excluded. The erroneous etymologies discussed in Junttila 2011 have also been left out, unless they have reappeared in a more recent study (i.e. Vaba 2011a)[1].

The words are given in Finnish, if not indicated otherwise. Only the stems missing in Finnish are given in another Finnic language. However, the indicative meanings of a word given aim at covering all its Finnic cognates.

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[1] The author owes special thanks to Dr. Laimute Balode for checking the Eng. translations for the Lithuanian and Latvian words.

Group I. Game and hunting

In this group, as well as in most of those that follow, it is not possible to sharply and exclusively determine which words denote innovation and which do not. Even the names of wild animals could be added to the list, since their adaptation may indicate a new capturing technique, a change in diet or clothing, or new methods of trade.

A. Relatively clear etymologies

1. *ansa* ‘trap’ ~ Lith. *ąsa* ‘ear, handle’, Latv. *osa* ‘ear, handle’ (Donner 1884: 267).
2. *lahto* ‘kind of bird trap’ ~ Latv. *slazds* ‘trap’ (Thomsen 1890: 219).
3. *hirvi* ‘elk; (Est) deer’ ~ OPr. *sirvis* ‘deer’ (Thomsen 1890: 225).
4. *tarvas* ‘aurochs (?)’ ~ Lith. *tauras*, Latv. *taurs* ‘aurochs’ (Thomsen 1890: 228).
5. Veps *hähk* ‘mink’ ~ Lith. *šeškas*, Latv. *sesks* ‘polecat’ (Thomsen 1890: 223).
6. SEst *kähr* ‘European badger’ ~ Lith. *keršas* ‘black and white striped’ (Vaba 1995: 82).

B. Dubious etymologies

1. *peura* ‘deer, reindeer’ ~ Lith. *bendras* ‘common’ (Koivulehto 1988: 26). The semantic leap is very large.
2. *portimo* ‘stoat; (Lude) weasel’ ~ Lith. *spartus* ‘quick’ (Liukkonen 1999: 106–07 Baltic **sparteiva*). The proposed original is an unattested derivative. Finnic *m* ~ Baltic. *v* is irregular. The Finnic -*ti*- implies a borrowing posterior to the Early PFi **ej* > *i* change, which would have yielded *-*si*-.
3. Kar. *utra*, Est. *udras* ‘European otter’ ~ Lith. *ūdra*, *ūdras* id. (Nuutinen 1994: 116–27) A Germanic origin (PGmc **utra*-) would suit as well.

C. Erroneous etymologies

1. *paula* ‘lace, snare’ ~ Lith. *pakelė*, Latv. *pakeles* pl. ‘garter’ (Donner 1884: 269)[2]. Phonetically unsuitable.
2. *kärppä* ‘ermine’ ~ Lith. *kirbas* ‘decorative piece of fur’ (Būga 1908: 191). Baltic -*rb*- would not yield Finnic -*rpp*-.
3. Est. *naarits* ‘mink’ ~ OPr. *naricie* ‘polecat’ (Saareste 1924b: 84–85). Both Finnic and Baltic words are loans from Slavic (Russ. *norica* id, Kalima 1952: 130).[3]

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[2] In Junttila 2011, there is a mistake in the first table: the Lith. *pakelė* ‘garter’ mentioned in connection with the Fi word *paula* is not found in the dictionaries visited.

[3] This etymology is missing in Junttila 2011.

Two etymologies, irrespective of their likeliness, should be kept outside this semantic group: *virka* 'snare, trap; line, row; career' ~ Latv. *verdze* 'row; heap' (Kalima 1941: 210–11) and *vihi* 'scent, surmise' ~ Lith. *vėžė* 'track', Latv. *vizināt* 'to ride' (Uotila 1986a Late PFi **vihja*). The connections with trapping here seem secondary as the original Finnic meaning of Finn. *virka* and *vihi* are 'row' and 'path'.

Smaller animals represented in the layer of Baltic loanwords fall clearly outside the scope of this article. Bird names are especially numerous among the proposed Baltic etymologies, but their value is highly questionable due to the onomatopoetic character of bird names in general. Since the likeliness of these etymologies is extremely hard to evaluate, a mere list would suffice here: *harakka* 'magpie', *kauru* 'curlew, (Est.) loon' *kiuru* 'skylark', *käki* 'cuckoo', *lielo* 'Caprimulgus', *lintu* 'bird', *peippo* 'chaffinch', *rastas* 'blackbird', *teeri* 'black grouse' Est. *värblane* 'sparrow', SEst. *mõltsas* 'green woodpecker', Liv. *kill* id., and Liv. *palandeks* ~ Vote *pallas* 'pigeon'. A Baltic origin also has been proposed for *siipi* 'wing' (Vaba 2011b: 48).

Group II. Fishing equipment and fish

A. Relatively clear etymologies

7. *toe* 'fish weir' ~ Lith. *takišys*, Latv. *tacis* id. (Thomsen 1890: 226 Baltic **takis*).
8. *siula* 'side rope of a seine; side fence of a reindeer enclosure' ~ Lith. *tinklas*, Latv. *tīkls* 'fish net' (Koivulehto 1979a: 267–69).
9. *tuulas* 'tool for spear fishing with a light' ~ Latv. *dūlājs* 'fishing light', Lith. *dūlis* 'smoking punk' (Thomsen 1890: 168).
10. *tuura* 'ice pick' ~ Latv. *dūre* 'fist', Lith. *durti* 'to jab, stick' (Thomsen 1890: 168–69).
11. *lohi* 'salmon' ~ Lith. *lašiša*, Latv. *lasis* id. (Thomsen 1869: 55).
12. *sampi* 'sturgeon' ~ Lith. *stambus* 'large' (Liukkonen 1999: 124).
13. *ankerias* 'eel' ~ Lith. *ungurys*, OPr. *angurgis*[4] id. (Thomsen 1869: 80).
14. Liv. *vägal* 'burbot' ~ Lith. *vėgėlė*, Latv. *vēdzele* id. (Thomsen 1890: 238).
15. Est. *vähi* 'crab' ~ Lith. *vėžys,* Latv. *vēzis* id. (Thomsen 1890: 241).

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[4] Gliwa (2009: 183) combines also Est. *vingerjas* 'Misgurnus fossilis' with Lith. *vingurys* 'eel', a contamination form of *ungurys* and IE **weng*- 'to bend'.

B. Dubious etymologies

4. Est. obs. *näri : närju* 'weir' ~ Lith. *nėris* 'knitwork' (Vaba 1992 < Baltic **nērija*). As a weir is not knit but vowen, Russ. *ner'ot* 'fish trap' suits semantically better as a source, though it implies a shortening of the Est. word (< **närjut*).
5. *ailo* 'string of a fish net' ~ Lith. *ailė* 'stick holding a net', Latv. *ailis* 'wooden support of a fish weir' (Endzelīns 1923–25: 13 (Būga)). However, synonymous with *aina* ? < PGmc **ainia-* 'juniper' (Karsten 1936: 435–37).
6. *ahrain* 'fish spear' ~ Russ. *ostrogá* id. (Liukkonen 1999: 102 Baltic **aštragā*). The variation *-hr-* ~ *-tr-* in Finnic could be, according to Liukkonen, better explained from Baltic *-*štr-* like in *ohra* (B17) than Slavic *-*str-*. Liukkonen ignores the Eastern Finnic variant -*sr-*.
7. SEst. *eherüs*, *iherüs* 'brown trout' ~ Lith. *ešerys*, Latv. *asaris* 'perch' (Ojansuu 1921: 5). However, brown trout and perch look quite different from one another.
8. *seipi* 'dace' ~ Latv. dial. *stiepats* id. (Nuutinen 1987). The Latvian words remain without etymology.

C. Erroneous etymologies

4. *vata* 'type of small seine' ~ Lith. *nevadas* id. (Donner 1884: 265). Finnic < Germanic, cf. Swed. *vad* 'seine' (Thomsen 1890: 234).
5. *ahingas* 'fish spear' ~ Lith. *asnis*, *ašnis* 'mane hair; rye sprouts; scythe blade', Latv. *asns* 'erupting germ' (Liukkonen 1999: 15–16). Phonological problems (Baltic *-*šn-* ~ Finnic -*h-*) and hardly compatible semantics.
6. *tarpa* ~ *tarpo* 'fisherman's stick' ~ Latv. *dalba* ~ *dalbs* 'fork; stem; fishing stick', Lith. *dalba* 'crowbar, lever', OPr. *dalptan* 'iron pick' (Thomsen 1890: 165–66). The relation Baltic *l* ~ Finnic *r* is problematic. The Latv. meaning 'fishing stick' may be < Finnic. Finnic *tarpa* ? < PGmc **staura-*, cf. Swed. *stör* 'stick' (Koivulehto 1977: 175).
7. *kuuja* 'type of salmon' ~ Lith. *kuoja* 'roach' (Endzelīns 1909: 30). The two fish species are very different. Probably Finnic *kuuja* ← *kuu* 'fat' (Sebestyén 1935: 73).
8. *taimen* 'trout' ~ Lith. *dygti* 'to germ', *daigas*, *diegas* 'shoot, spear; seedling' (Ritter 1993: 156 Baltic **daigmen*). Semantically unfounded.
9. *ahven* 'perch' ~ Lith. *ašmuo* 'sharp' (Thomsen 1890: 147, Liukkonen 1999: 16–18). A very speculative etymology and phonologically excluding Saa *vuosko* 'perch'.
10. Est. *lest* 'flounder' ~ Lith. *plekšnė*, Latv. *plekste* id. (Viitso 1983: 272) or ~ Latv. *leste* id., Lith. *lekštas* 'flat' (EES). Phonologically only a recent loan from Latvian is possible (Est. *s* ~ Latv. *s*).
11. *hauki* 'pike' ~ Lith. *šauti*, Latv. *šaut* 'to shoot' (Liukkonen 1999: 40–42 Baltic **šaukē*). The proposed original is a hypothetical derivative from a root with no credible connection to the fish name.

12. *särki* 'roach' ~ Latv. *sarkans* 'red' (Liukkonen 1999: 138–40 Baltic **sar-k-*). The Finnic word = Md(E) *śerge* id. shares the front vocalism. Moreover, the word has phonologically regular cognates in Mari and Ob-Ugrian (see SSA III: 241).
13. Est. *linask* 'tench' ~ Lith. *lynas* id. (Ojansuu 1921: 22–23). Est. < Russ. *lin'*, *lin'ok* id. (Thomsen 1890: 197).

The Baltic explanation for *pola* 'float or hook of a kind of fish trap' (~ Latv. *spals* 'handle of a tool' < Baltic **spala-*, Koivulehto 1987: 204) should be left out, since the meaning of both the proposed original and the Md cognates of the Finnic word (Erzya *pulo*, Moksha *pulə̑*) may be reverted to 'handle, shaft' and are not necessarily connected to fishing. The same applies to *ahingas* (C5), if it is connected to Lith. *akstinas* 'thorn; reason' as suggested by Thomsen (1890: 157).

Group III. Forest beekeeping

This semantic category has been researched especially by Vaba, who has posited a hypothesis that the forest beekeeping in southern Estonia emerged as a result of Baltic contacts (Vaba 1990a).

A. Relatively clear etymologies

16. *vaha* 'wax' ~ Lith. *vaškas*, Latv. *vasks* id. (Weske 1890: 170)

B. Dubious etymologies

9. Est. *kärg* (dial. *kärr*, *käri*, *kärv*) 'honeycomb' ~ Lith. *korys*, Latv. *kāres* id. (Vaba 1990a: 174–75). Est. *kärg* = MdE *keŕaz*; possibly = Mari *karaš*, *käraš*, Udm. *karas* (see Pareren 2008: 27). Perhaps Udmurt and Mari have borrowed the Finnic-Mordvinic word, as Tatar and Chuvash have?
10. SEst. obs. *kõno* 'rope ladder (used in collecting honey)' ~ Lith. *genys*, Latv. *dzenis* 'foot hook for climbing on trees' (Vaba 1990a: 176–77). Semantically problematic.
11. SEst. obs. *läng* 'hoist' ~ Latv. *liedzējs* 'safety cord' or = Mari *leŋŋe* id. (Vaba 1990a: 177)

C. Erroneous etymologies

14. Est. *taru* 'hive' ~ Lith. *dravis*, Latv. *drava* 'forest beehive' (Manninen 1926: 18). There are no certain cases of a metathesis of an initial consonant cluster among the Baltic loanwords (cf. C31). Certainly ← *tarha* (A17).

Group IV. Agriculture

A. Relatively clear etymologies

17. *tarha* ‘garden, enclosure’ ~ Lith. *daržas*, Latv. *dārzs* id. (Thomsen 1869: 73).
18. *kulo* ‘forest fire; unmown hay’ ~ Latv. *kūla* ‘last year’s grass’, Lith. *kūlė* ‘threshing’ (Thomsen 1890: 190–91).
19. Est. *kõblas* ‘hoe’ ~ Lith. *kaplys*, *skaplis* ‘pick’ (Toivonen 1917b: 36–38)[5].
20. *vako* ‘furrow’ ~ Lith., Latv. *vaga* id. (Donner 1884: 267).
21. *siemen* ‘seed’ ~ Lith. pl *sėmenys* ‘linseed’ (Thomsen 1869: 5).
22. *siikanen* ‘(barley) awn’ ~ Lith. *dygas* Latv. dial. *dīgs* ‘thorn’ (Posti 1969).
23. *pelu* ‘husk, chip’ ~ Lith., Latv. *pelus*, OPr *pelwo* ‘husk’ (Thomsen 1890: 207).
24. *rouhia* ‘to bruise, mill’ ~ Latv. *krausēt* id., Lith. *kraušyti* ‘to strike’. (Kalima 1936: 156).
25. *vakka* ‘type of wooden vessel with a cap; cereal gauge’ ~ Lith. *voka* ‘cover, eyelid’, *vokas* ‘cereal gauge’, Latv. *vāks* ‘lid, cover’ (Koivulehto 1990: 152).
26. *talkoot* ‘bee, work party’ ~ Lith., Latv. *talka* id. (Donner 1884: 266).
27. *herne* ‘pea’ ~ Lith. *žirnis*, Latv. *zirnis* id. (Thomsen 1869: 48).
28. *puuro* ‘porridge’ ~ Lith., Latv. *putra* id. (Thomsen 1890: 210).
29. *hiiva* ‘yeast’ ~ Lith. *šyvas* ‘gray; home-made ale’ (Plöger 1982: 93 (Koivulehto)).

B. Dubious etymologies

12. *metsä* ‘forest’ ~ Lith. *medis* ‘tree; wood’, Latv. *mežs* ‘forest’ (Thomsen 1869: 80). However, the word has also been compared to Saa *meahčči* ‘periphery’ and Hungarian *messze* ‘far away’ (see SSA II: 163).
13. *halme* ‘swidden being cultivated’ ~ Lith. *želmuo*, Latv. *zelmenis* ‘sprout’ (Thomsen 1890: 245–46). The concurring Germanic etymology (~ Swed. *halm* < PGmc **halmaz*, cf. ‘straw’, Toivonen 1917b: 6–8) is not worse in any sense.
14. *huhta* ‘burnt swidden’ ~ Baltic **šukta* ‘set in fire’ (Koivulehto 1991: 31–32). Later, Koivulehto (1999: 225–26) has preferred an Iranian original, since the proposed stem is not attested in Baltic.
15. *ätelä* ‘aftergrass’ ~ Lith. *atolas*, Latv. *atāls* id. (Thomsen 1890: 159–60). The Finnish word is attested only on the islands of the Gulf of Finland, and is thus most probably borrowed from Est. where it may in turn be a Latv. borrowing (Ojansuu 1916: 202).
16. *taimi* ‘seedling, plant’, cf. C7 (Thomsen 1869: 151). The Baltic form is hypothetical.

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5. Est. *kõblas* certainly not ~ Lith. *kopla* ‘kind of ax’ (Nieminen 1945: 528)

17. *ohra* 'barley' ~ Lith. *aštrus* 'acute, bitter' (Ojansuu 1921: 27–28). In this book, Petri Kallio proposes an elegant possibility to avoid reconstructing **str* as the only three-consonant cluster in Early PFi by supposing *ohra* an Aryan etymology. That would drop also *ahrain* (B6) from among the Baltic loanwords.
18. Est. *lina* 'flax, linen' ~ Lith. *linai*, Latv. *lini* id. (Donner 1884: 265). As well < Slavic, cf. Russ. *l'on* (Thomsen 1890: 196).
19. SEst. *judras*, Liv. *juddõrz* 'Camelina sativa' ~ Lith. *judrios* Latv. *judras* (Thomsen 1890: 175). The Baltic word has remained thus far without an IE etymology, but it may be connected with Germanic **duđra-*, a name of diverse (yellow) plants, including Camelina sativa (either < PIE *d^hewd^h- 'yellow' as in Schindler 1967, or ~ Sanskrit *dudhra-* 'violent', as in Orel 2003: 78), if the initial *j-* can be explained by a contamination with Lith. *judrus* 'agile, frisky, stirring'. The South Estonian and Livonian words are probably of a later Latvian origin.
20. *sato* 'harvest, (obs.) hayrick' ~ Lith. *statà*, *stãtas* 'row of shocks', Latv. *stats* 'unit of grain or flax' (Nuutinen 1989: 28–29). The Germanic cognate of the Baltic words (PGmc **staþa-*) suits as well as source.
21. *äes* 'harrow' Lith. *akėčios*, obs. *ekėčios* id. (Donner 1884: 263). A Germanic origin (PGmc **aγiþ-* ~ **aγeþ-*) is equally possible (Koivulehto 1971b: 591).
22. *viikate* 'scythe' ~ Latv. *izkaptis* id. (Nieminen 1955: 79). The explanation is phonologically very problematic, but perhaps not totally impossible.
23. *ruumen* 'husk' ~ Lith. *grūsti* 'to beat, crush' Latv. *grūst* 'to shove, thrust' (Thomsen 1890: 173 Baltic **grūd-men-*). The concurring Germanic explanation (~ Germ. *Krume* 'crumb', Hahmo 1990: 212) is semantically less satisfactory.
24. *pahmas* 'cereal gauge; threshing vessel in a mill' ~ Lith. obs. *bažmas* 'amount, mass' (Ojansuu 1921: 29). Vaba (1996b) tries to bridge the semantic gap.
25. *kärväs* '(a grain drying rack made of) a branchy tree stump' ~ Lith. *kerėbla*, *kerėža* 'small wizened tree, stump' (Uotila 1970: 3–6). Both the Baltic and the alternative Germanic etymology (~ Old Norse *harfr* 'harrow' < PGmc **harbaz*, Koivulehto 1971b: 585–92) are phonologically somewhat tricky.
26. *olut* 'beer' ~ Lith., Latv. *alus* id. (Thomsen 1869: 55, 88). A Gmc origin is at least as plausible (PGmc **aluþ*, see SSA II: 264–65). Baltic < Germanic?
27. *metu* 'mead' ~ Lith., Latv. *medus* 'honey' (Setälä 1897). A Germanic origin is equally possible (PGmc **među-*, see SSA II: 164).

C. Erroneous etymologies

15. *moisio* ‘remote field; (Est.) manor’ ~ Lith. *mietas* ‘pale, picket, stake’, Latv. *miets* id. (Wiklund 1927: 308 Baltic **maita-*+ *-iōn*). An etymology with impossible phonology, highly hypothetical morphology and clumsy semantics.
16. *vannas* ’ploughshare’ ~ OPr. *wagnis* id. (Paasonen 1909). Both the Finnic and the OPr words are borrowed from Germanic **waγnaz* (Karsten 1915: 84–85, Nieminen 1944: 28–30). The ploughshare arrived in Finland during the Viking era (<http://www.helsinki.fi/kansatiede/histmaatalous/peltoviljely/vetojuhdin.htm>).
17. *sirppi* ‘sickle’ ~ Latv. *sirpis* id. (Donner 1884: 269). Both < Slavic, cf. Russ. *serp* (Thomsen 1890: 12).
18. *jyvä* ‘grain’ ~ Lith. *javai* ‘grain’ (Donner 1884: 264). A more remote IE origin is evident since the Finnic word has cognates in Permic (Paasonen 1896: 12–13).
19. Est. *singas* ‘sheath where the cereal germ grows’ ~ Lith. *digna* ‘rainbow, corona’, *dingti* ‘to disappear’ (Vaba 1997a). Implies overly long semantic leaps.
20. *sora* ‘gravel’ ~ Lith. *sora* ‘millet’. (Tihomirov 1906: 146). The relation is phonologically impossible and the Lith. word lacks any IE etymology (Smoczyński 2007: 583).
21. *ruis* ‘rye’ ~ Lith. *rugys* id. (Thomsen 1869: 144). Surely < Germanic **ruγiz*; there are no Finnic **ihi*-stems among the Baltic borrowings; the Baltic form would have yielded a Finn. form ***rue* (Thomsen 1890: 212–13).
22. SEst. *rügä* ‘rye’, cf. C19 (Ojansuu 1921: 35). Probably a contaminated form of Finnic **rukis* ‘rye’ (Mägiste 1934: 80).
23. SEst. *kesv* ‘barley’ ~ Latv. dial. *ciesva* ‘hard grass’ (Ojansuu 1921: 16–17). Nieminen (1946) has disproved this comparison by pointing out Lith. *kieša* ‘thicket’.
24. *porkkana* ‘carrot’ ~ Lith. *burkantas*, Latv. *burkāns* id. (Donner 1884: 266). The sound structure of the Finnic word is relatively recent and the first syllable *o* cannot result from Baltic **u*. Possible explanations have been suggested by Bentlin 2008: 246–49.
25. Est. *uba* ‘bean’ ~ Lith., Latv. *pupa* id. (Kalima 1936: 174). Phonologically very suspect.
26. Est. *pakal* ‘tow’ ~ Lith. pl. *pakulos*, Latv. pl. *pakulas* id. The Est. word may rather be explained through Slavic (Est. < Russian *pakl'a* ? < Baltic, Thomsen 1890: 205)[6]
27. *karpio* ‘cereal gauge’ ~ Lith. *karbija* ‘big woven vessel’, OPr. *carbio* ‘mill case’ (Donner 1884: 267). Most possibly all these are from Slavic (Thomsen 1890: 183).

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[6] This etymology is missing in Junttila 2011.

28. Est. *rääts* ‘kind of sieve or basket’ ~ Lith. *rėtis* ‘sieve’ (Thomsen 1890: 141). The long *ä* and the final *-ts* indicate a later origin.
29. *sima* ‘mead’ ~ Lith. *syvas* ‘juice’ (Ojansuu 1921a: 36).
30. *kalja* ‘low-alcohol ale’ ~ Lith. *galia* ‘might, strength’ (Liukkonen 1999: 68–69). The semantic leap is too wide. Maybe < PIE **$h_2$al-ew-jo* (Kallio 1998b).

It is noteworthy that the stems A18 and B13–15 refer to primitive slash and burn agriculture, while none of the etymologies indicate more developed field cultivation: *pelto* ‘field’ is most likely a Germanic loan. Stem B12, the most common word for ‘forest’ in Finnic, is included here, since its existence implies an environment opposed to forest.

An abundance of weather expressions among the Baltic etymologies may also indicate a connection with agriculture, especially since they all indicate harmful phenomena from a farmer’s point of view: *helle* ‘hot weather’, *halla* ‘summer night frost’, *härmä* ‘mildew’, ?*kylmä* ‘cold’, *kirsi* ‘ground frost’, *räntä* ‘sleet’ and ?*pälvi* ‘snow-free spot on ground’. Note that all of these, with the exception of the first one, refer to cold weather events.

Group V. Milk cattle

A. Relatively clear etymologies

30. *vuohi* ‘goat’ ~ Lith. *ožys* id. (Thomsen 1869: 58)
31. *rieska* ‘fresh; fresh milk; fresh bread’ ~ Lith. *prėskas* ‘fresh, unsalted’ (Thomsen 1890: 209)
32. *mäntä* ‘piston’ ~ Lith. *mentė* ‘shoulder-blade’ (Budenz 1875: 389 ?)

B. Dubious etymologies

28. *muli* ‘hornless cow’ ~ Samog. *šmulas*, Latv. obs. *mūle* id. (Thomsen 1890: 226). The Finnic word is an *i*-stem, i.e. younger than PFi. However, the Finnic word may be ← **mula-* < Baltic just as *keli* ← **keljä* < Baltic (A53). See also B29 below.
29. *vohla* ‘kid’ ~ Lith. (diminutive) *oželis* ‘goat’ (Kalima 1936: 181). The absence of the vowel in the original second syllable may have been caused by the preceding *h*.
30. *hehko* ‘heifer’ ~ Lith. *ašva*, older *eschwa* ‘mare’ (Thomsen 1890: 146–47). The Finnic word could as well be ~ PGmc **exwaz* ‘horse’ although its feminine counterpart has not been attested.
31. *piimä* ‘sour milk; (Est) milk’ ~ Lith. *pyti* ‘to take milk’ (Larsson 1984 Baltic **pijimas*). The suggested original Baltic derivative is not attested.

C. Erroneous etymologies

31. *nauta* ‘cattle, bovine’ ~ Lith. *naudà* ‘advantage; property’ (Mikkola 1912). A Germanic origin (PGmc **nauta-*) is semantically much better: Swed. *nöt* ‘neat’ (see SSA II: 210)
32. Est. *tõug* ‘race’ ~ Lith. *daug* ‘much’, Latv. *daudz* id. (Kalima 1936: 170). Probably = *tõug* ‘harvest’
33. *kerma* ‘cream’ ~ Lith. *grėjimas*, Latv. *krējums* id. (Mäkeläinen 1978). There are no sure cases of metathesis of an initial consonant cluster among the Baltic loanwords.
34. Vote *suura* ‘cheese’ ~ Lith. *sūris* id. (Suhonen 1980: 205 (Ariste)). Most probably the Vote word is just a variant of *syyra* id. < Russ. *syr* id.
35. Liv. *sõira* ‘cheese’ ~ Latv. *siers* id. (Fraenkel 1965: 944–45). The regular Livonian representation of the Baltic diphthong **ai* ~ **ei* (> Lith., Latv. *ie*) is *ai*; *õi* is possible in somewhat more recent loans.
36. Liv. *mändrõks* ‘piston’ ~ Lith. *menturė* id., Latv. dial. *mieturis* id. (Thomsen 1890: 141). A relatively recent loan because of the -*ks*-stem.
37. *maito* ‘milk’ ~ Lith., Latv. *maita* ‘carcass’ (Liukkonen 1999: 92–93). Semantically impossible.

Finnic *karja* ‘cattle’ may be excluded from this group, since its proposed Baltic and Germanic originals mean ‘army’ (OPr. *karia*, Lith. obs. *karias*, Germanic **harja-*. (Būga 1980: 27, Nissilä 1954: 254–55). The same applies to two names of milk vessels: *rainta* ‘milking vessel’ ~ Lith. *rakandas* ‘kitchen utensil’ (Ojansuu 1921: 34–35) and *lännikkö* ‘a shallow wooden milk vessel’ ~ Lith. *lenta* ‘board, plank, table’ (Uotila 1970: 8–10 ← **läntä* ‘linden’).

Group VI. Sheep and wool

A. Relatively clear etymologies

33. *oinas* ‘ram’ ~ Lith. *avinas* id. (Thomsen 1869: 55 73)
34. *villa* ‘wool’ ~ Lith., Latv. *vilna* id. (Thomsen 1869: 79)

B. Dubious etymologies

32. *vuona* ‘lambkin’ ~ Baltic **ōgnas*, cf. similar words in Latin, Greek and Slavic with same meaning; not attested in Baltic (Paasonen 1917)
33. *karsta* ‘wool comb’ ~ Lith. *karšti* ‘to comb’ (Mikkola 1894: 126–27 Baltic **karšta*). An Early PFi **-ršt-* could have in fact developed to *rst* since ***rht* is impossible in Finnic. However, the suggested original Baltic derivative is not attested.

C. Erroneous etymologies

38. *jäärä* 'buck' ~ Lith. dial. *jėras*, Latv. *jērs* 'lamb' (Donner 1884: 264). The word could be < Slavic (~ Russ. *jarka* 'lamb') as Finnic *ää* is of late origin.
39. Est. *utt* 'ewe; lamb' is not < Baltic as claimed by Vaba 2011a: 753 but = Finn. *uuhi* id., with sure cognates at least in Md, Mari, and Permic (see SSA III: 379).

Group VII. Other words connected with domesticated animals

When this group is defined broadly, words denoting fodder, meadows and wetlands suitable for pasture, vegetation, and even insects living in these environments may be included. These are quite well represented among the Baltic etymologies. Some of the plants and insects named may be endemic in the Finnic area, but it would be worth studying how much their spread and conspicuousness is due to cattle breeding. It is possible that the first two words below, *pahr* and *hanhi* have initially referred to game (Group I).

A. Relatively clear etymologies

35. SEst. *pahr* 'boar' ~ Lith. *paršas* 'piglet' (Anderson 1893: 240).
36. *hanhi* 'goose' ~ Lith. *žąsis*, Latv. *zoss* id. (Thomsen 1869: 83).
37. *paimen* 'herd' ~ Lith. *piemuo* id. (Thomsen 1869: 5 33)[7].
38. *torvi* 'pipe, horn' ~ Latv. *taure* 'trumpet, horn', Lith. *taurė* 'bowl, glass' (Thomsen 1890: 230–31).
39. *väive* 'chewing louse' ~ Lith. *vievesa* id. (Thomsen 1890: 241).
40. *kupo* 'wisp (of hay)' ~ Lith. Latv. *guba* '(hay) shock' (Nieminen 1934: 27).
41. *suova* 'haystack'~ Lith. *stovas* 'rack, stand', Latv. *stāvs* 'stature; storey' (Nuutinen 1987: 59)[8].
42. *luhta* 'flood meadow' ~ Lith. *lukštas* 'Caltha palustris' (Thomsen 1890: 197).
43. *heinä* 'hay' ~ Lith. *šienas*, Latv. *siens* id. (Thomsen 1869: 33).
44. *korsi* 'cane' ~ Lith. *kartis* 'thin rod', *kartis* 'mowing, raking', *karčiai* (pl.) 'mane' (Koivulehto 1979a: 137–39)
45. *takiainen* 'burdock' Lith. *dagys* id. (Donner 1884: 268)[9].
46. *vihvilä* 'rush' ~ Lith. *viksva* 'Carex' (Thomsen 1890: 242).

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[7] The Baltic origin has been considered certain since Thomsen. However, a cognate of the Baltic word exists also in Germanic, though only as a feminine form (Old Norse *feima* 'bashful girl, young lass'). A masculine form **faimōn* may have existed in Proto Germanic.

[8] This etymology is missing in Junttila 2011, where only an older Baltic explanation for *suova* by Kalima has been analysed and disqualified. Nuutinen's etymology, instead, seems fully acceptable.

[9] Another similar plant, the thistle, may have got its Finnic name *ohdake* as a derivative from **ohta-* < Baltic, but the original meaning of the stem has supposedly been 'awn, husk, small fish bone' (Lith. *ašaka*, Latv. *asaka*, Posti 1977: 268)

B. Dubious etymologies

34. *laukki* 'white spot on a large animal's forehead; an animal with a white spot on the forehead' ~ Lith. *laukis*, Latv. *lauks* 'cow, horse, etc. with a white spot' (Donner 1884: 268). In Finnic, neither the sound structure -VVCC- nor the *i*-stems are old[10].
35. *karsina* 'pen (for animals)' ~ Lith. *gardinas* 'enclosure' (Tunkelo 1928: 285–87). On the other hand, Gothic *garda* (Gen. *gardins*) 'barrier, enclosure' is both phonologically and semantically as close to the Finnic word.
36. *tiine* 'pregnant (of animals)' ~ Lith. *dieni* id. (Lõo 1911: 86). Liukkonen (1999: 144) has proposed here a PFi sound change **ei* > *ii*, but it is impossible to reconstruct in the first syllable of inherited words. The other possible way to combine *tiine* with Baltic **deini-* would be to suppose **ei* > *ii* as a substitution pattern and posit the borrowing posterior to Finnic **ti* > *si*, but no other such late cases have been proposed.
37. *kiiliäinen* 'gadfly, botfly (a fly annoying livestock)' ~ Lith. *gylys* id. (Mikkola 1906: 78). A Khanty cognate has also been proposed (Toivonen 1929: 67–68)
38. *apila* 'clover' ~ Lith. *dobilas*, Latv. *āboliņš*, OPr. *wobilis* 'apple; clover' (Thomsen 1890: 156 Baltic **obilas*). The Baltic word is originally with **d-* and its origin is unknown (Smoczyński 2007: 117).
39. *angervo* 'Filipendula' ~ Lith. *vingiarykštė* id. (Liukkonen 1999: 21). Liukkonen explains the omission of Baltic *v-* as being a result of dissimilation; however, this implies an unattested derivative Ba **vangarvā*.

C. Erroneous etymologies

40. Kar. *kartta* 'manger' ~ Lith. *prakartas* id., OPr. *pracartis* 'trough' (Mikkola 1894: 127 Baltic **karta*). The semantics of the Baltic word is restricted to the prefixed form (Lith. *kartas* cf. *kartis* A44) and the sound structure of the Finnic word is relatively recent (-rCC-).
41. *kyäs*, *kykäs* 'sheaf' ~ Lith. *kūgis* 'cone, stack' (Toivonen 1917b: 38). The Germanic originals (PGmc **skukka-* or **hukka-*) proposed by Koivulehto (1971b: 581–83) are phonologically much better.
42. *laukku* 'hole; dell' ~ Lith. *laukas* 'field' Latv. *lauks* id. (Saareste 1922: 144). The Germanic etymology (~ PGmc **lauka-* 'opening') by Koivulehto (1971a: 20–22) is both phonologically (a recent sound structure -VVCC-) and semantically more suitable.

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[10] Two other proposed *i*-stems of Baltic origin are adjective-like nouns describing the colours of domestic animals: *halli* 'light grey animal' ~ Lith. *šalnis* id. and *harmi* 'grey animal' ~ Lith. *širmis* id. Since all the mentioned Lith. words are Baltic deadjectival **-ij-a-*derivatives, Thomsen (1890: 117–18) suggested that the Baltic **-ij-*suffix has also been borrowed to Finnic to form names of domestic animals from adjectives (*musti* 'black dog' ← *musta* 'black'). However, the similarity of the suffixes may be purely coincidental.

43. *luoma* ‘brook; dell’ ~ Lith. *loma*, Latv. *lāma* ‘depression, valley’ (Tunkelo 1928: 301–02). The intonation pattern of the Lith. and Latv. words implies a foreign origin. The Finnic word may be ← *luoda* ‘to create’.
44. *loma* ‘hole; valley’, cf. C41. (Sammallahti 1977: 124). The Finnic word has possible cognates in Saa, Md, and Mari, but the vowel of the first syllable does not correspond to Baltic **ā* (> Lith. *o*).
45. *lamu* ‘plateau, lowland, dell’, Est. *lamakas* ‘large block’ ~ Lith. *lamakas*, *lamantas* ‘block’ (SSA 2: 43). The Finnish word corresponds rather to Russ. *lom* ‘scrap, breakage; (dial.) marsh’, whereas Est. *lamakas* may be borrowed from Russ. *lomot′* ‘slice’.
46. Liv. *keŗk* ‘cricket’ ~ Latv. *circenis* id. (Penttilä 1938: 495). The PFi shape of the Livonian word cannot be reconstructed without a relatively recent cluster *-rCC-.

Vaba (2011a: 753) has included here also the anatomic terms *karva* ‘hair (not of the human head)’, Est. obs. *hürn* ‘fallen hair’, *harja* ‘mane; brush’, and *sapa* ‘tail’. The semantic connection with cattle, as opposed to wild animals, is still not obvious.

Group VIII. Horses, oxen, and vehicles

A. Relatively clear etymologies

47. *juhta* ‘draft animal’ ~ Lith. *jungti* ‘to attach, join’, Latv. *jūgt* ‘to yoke, team, harness’ (Thomsen 1890: 175).
48. *härkä* ‘ox’ ~ Lith. *žirgas* ‘steed’, Latv. *zirgs* ‘horse’, OPr. *sirgis* ‘stallion’ (Thomsen 1890: 249).
49. *ratas* ‘wheel’ ~ Lith. *ratas* id. (Thomsen 1869: 73). A PGmc masc. **raþaz* id. would also be a suitable source, though only neuter forms (**raþan*) have been attested, but another Proto-Baltic word for ‘wheel’, **kelan*, has been borrowed with a different meaning (A72), which supports the Baltic origin of Finnic *ratas*.
50. *kaplas* ‘vertical support between skid and bottom of a sleigh’ ~ Lith. *kablys* ‘hook’, Latv. *kablis* ‘clasp’ (Liukkonen 1973: 25–30). The referents share a common shape.
51. *ketara* ‘kaplas (A50)’ ~ Lith. (*s*)*ketaras* ‘nape’ (Būga 1980: 72, Posti 1977: 265–66).
52. *kausta* ‘upper beam of a sleigh’ ~ Latv. *skausts* ‘nape’ (Posti 1970)
53. *keli* ‘road conditions’ ~ Lith. *kelias* ‘road’ (Thomsen 1869: 80).
54. *lojo* ‘kind of sleigh’ ~ Lith. *šlajos* id. (Liukkonen 1999: 86–87).

B. Dubious etymologies

40. *orhi* ‘stallion’ ~ Lith. *aržilas*, *eržilas* id. (Ojansuu 1921: 29). Another possibility is a derivation from *ora* ‘awl; penis’ (Ruoppila 1943: 38–45), but the derivational relation is not clear. The Lith. words ← PBa **aržis* ‘testicle’ (Smoczyński 2007: 24).
41. Est. *täkk* ‘stallion’ ~ Latv. *tekis* ‘ram’, Lith. *tekis*, *takis* id. (Saareste 1924a: 47). The Est. word is a *u*-stem and thus preferably of later Latv. origin.
42. Liv. *kēv* ‘mare’ ~ Lith. *kėvė* ‘nag’, Latv. *ķēve* ‘mare’ (Toivonen 1917b: 36 = Skolt Saa. *kiev*). The Liv. word is an *i*-stem and thus most probably of late Latv. origin. The Latv. word is recent as well, because of *ķ*-. No certain IE etymology.
43. *valjaat* ‘harness’ ~ OPr *walis* ‘swingle-tree’ (Sköld 1982). Sköld suggests that the swingle-tree was very essential to the new kind of harness learnt by the Baltic neighbours, which could explain the meaning shift[11].
44. *jutta* ‘yokeband’ ~ Latv. *jūtis* ‘joint, crossroads’ (Posti 1977: 263–64 < PBa **jutas*). No certain Baltic original.
45. *vehmaro* ‘shaft of a yoke’ ~ Lith. *vežimas* ‘carriage’ (Posti 1972). The Baltic original would have been a *-*ma*-derivative **vež-ma*-.
46. *aisa* ‘wagon shaft’ ~ Baltic **aisā* ~ **aisa,* cf. similar Slavic and Old Indian words with same meaning; not attested in Baltic (Lidén 1897: 60)
47. *reki* ‘sleigh’ ~ Lith. dial. *ragės*, Latv. *ragavas*, obs. *raga* id. (Thomsen 1890: 211). The vowel in the first syllable creates some trouble that Vaba (1997c) has tried to solve.

C. Erroneous etymologies

47. *paatsa* ‘saddle cushion’ ~ OPr. *paddis* ‘harness’ Lith. *padis* ‘gantry’[12]. (Thomsen 1890: 205). Finn. < Old Swed. *baza* ‘saddle blanket’ (Mikkola 1893: 388)
48. *hevonen* ‘horse’ ~ Lith. obs. *ašvienis* ‘working horse’ (Liukkonen 1999: 44–48 < Baltic **ešvåinis*). Finn. *hevonen* ← *hepo* id. ? < PGmc **exwa*- (Nikkilä 1991). Both Veps *hebo* and Liv. *õbbi ibbi* imply a development PFi *-*p*- > Finn. -*v*- and not vice versa.
49. *kavio* ‘hoof’ ~ Baltic **kapūta*-, Russ *kopýto* id. (Liukkonen 1999: 69–70) No *-*t*- can be reconstructed in the PFi form (Veps *kabj*, Liv. *käbā*). The Baltic form is not attested. Finnic ? < Early PGmc. **χāfa-z* (Hahmo 1988: 118–19).

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[11] Liukkonen (1999: 113) combines *valjaat* with Lith. *pavalkai* ‘horse-collar’, which is semantically (see C48) as well as phonologically impossible.

[12] This Baltic stem was also combined with *patja* ‘mattress; (Est. Liv.) pillow’ by Būga (1911: 243), though the correct etymology (< Gmc **bađja*-) was already given by Thomsen (1869: 140).

48. *ranget* ‘horse collar’ ~ Lith. *arklio apranga* ‘harness’ (Suhonen 1989: 213). The horse collar was an East Asian innovation that spread to Europe during the 10th century AD (Needham 1986: 317–28). The Finn. word has been explained from Swed. dial. *vrang* ‘boat frame’ (Mikkola 1894: 16–17).
49. *länget* ‘horse collar’ ~ Lith. *lenkė* ‘sleigh runner’ (Liukkonen 1999: 113). See C48. Finn. *länget* is most probably ← *länkä* ‘crooked, bent’ (see SSA II: 125).
50. *ohja* ‘rein’ ~ Latv. dial. *važa* id. (Ritter 1995: 196 EBa **wadžja*- or Liukkonen 1999: 100–101 Baltic **våžja*). Ritter’s explanation is phonologically invalid, whereas Liukkonen’s explanation is based on an erroneous hypothesis on the origin of Lith. *važa* (see Koivulehto 2001: 56). The Finnic word has a good Germanic etymology (~ PGerm **ansjō*, Koivulehto 1981: 168).
51. *rahje* ‘strap connecting yoke or collar with wagon shafts’ ~ Lith. *rezgis* ‘plait, basket’, Latv. *režģis* ‘grid, grating’ (Liukkonen 1999: 112–114 Baltic **razgis*). Liukkonen’s explanation of the semantics is not convincing.
52. *ies* ‘yoke’ < Baltic **ingis* ~ Lith. *engti* ‘press, oppress’ (Liukkonen 1999: 57–59). The Baltic original is merely hypothetical, the semantic distance is long and the suggested substitution pattern Baltic *-*ng*- > PFi **ŋ* has no support among the Baltic borrowings of Finnic.
53. *rakentaa* ‘to harness; (Finn. also) to build’ ~ Lith. *užrakinti* ‘to shut’ (Liukkonen 1999: 113). However, the basic meaning of the Baltic verb root *rak*- is ‘to dig’ and the meaning ‘to close, cover’ of *užrakinti* is carried by the prefix *už*-.

In addition, *lava* (A70), *hihna* (A71), and Est. *sugar* may originally have been connected with vehicles.

The use of draft animals for work and transport seems to be fairly well represented in the Baltic layer of borrowings. In most of the dubious cases, comparative research into the semantic processes involving draft animal and vehicle terminology in other languages, especially in better-documented IE languages, could help in evaluating the proposed correlations.

Group IX. Waterways and water transport

A. Relatively clear etymologies

55. *järvi* ‘lake’ ~ Lith. *jaura* ‘marsh’ (Būga 1922b: 31 & a: 292–95 (Nieminen))
56. *lahti* ‘bay’ ~ Lith. *lanktis* ‘reel, swift’ (Posti 1977: 267–68)
57. *malo* ‘brow, edge; crack; bay, shore’ ~ Lith. *mala* ‘edge, shore’ Latv. *mala* id. (Loorits 1929: 175–76)

B. Dubious etymologies

48. *karvas* ‘light kind of boat’ ~ Lith. *karbas* ‘basket’, Latv. *kārba* ‘basket; kind of fishing boat’ (Thomsen 1890: 181–83). Presupposes that the Baltic words are = Latin *corbis* ‘basket’ and not < Germ. *Korb* id. < Latin. There are diverse opinions, see i.e. Orel 2003: 163 and Smoczyński 2007: 255. The Finnic word may otherwise be < Old Norse *karfi* ‘inland waterway vessel’ (see SSA I: 320).
49. *meri* ‘sea’ ~ Lith. *marios*, OPr. *mary* ‘bay, lagoon’ (Thomsen 1890: 199). As well < PGmc **mariz*. See Vaba 1997c for phonological arguments in favour of the Baltic etymology.
50. Est. *rahu* ‘reef; shelf’ ~ Latv. *graužas* ‘gravel; tidal sand pile’ (Vaba 1989: 215). The etymology would be unproblematic if there were not an equally good Germanic explanation < PGmc **hrauza*- (Tunkelo 1913–18: 24–26).
51. *ranta* ‘shore’ ~ Lith. *krantas* id. (Būga 1908: 30). More probably < Germanic, cf. Swed. *strand* id. (see SSA III: 48)
52. *liiva* ‘mud; slime; sand’ ~ Lith. *glyvas* ‘sea slime’, Latv. obs. *glīve* (Thomsen 1890: 173). Maybe < PGmc **slīwa*-, cf. Norwegian *sly* ‘slime’. SSA (II: 73–74) proposes that there are two homonymous words, *liiva*^{1} ‘sand’ < Baltic, and *liiva*^{2} ‘mud, slime’ < Germanic.
53. *lampi* ‘pond’ ~ Lith. *klampa* ‘marsh, swamp’ (Kilian 1986: 494). On the other hand, some proposed Samoyed cognates should be taken into account (see SSA II: 42).
54. *valkama* ‘haven’ ~ Lith. *vilkti*, Latv. *vilkt* ‘drag, pull’ (Nuutinen 1989: 44). Nuutinen proposed also a Slavic etymology (~ Russ. *volok* ‘portage’). A third possibility is ← *valkaa* ‘to leak, drip’, which is maintained by SSA (III: 339) to have a wide FU background.
55. *laito* ‘shallow water, grassy shore; (Est.) reef’ ~ either Lith. *šlaitas* ‘slope’ or Latv. *slaids* ‘sloping, slender’ (Kalima 1941: 210). More probably ← *laita* (C56).
56. Est. dial. *tabas* ‘fastening pole for a boat’ ~ Lith. *stabas* ‘pillar, column’, Latv. *stabs* id., OPr. *stabis* ‘stone’ (Vaba 1997b: 178). The distribution of the Est. word is limited to one parish at the Latvian border; thus it is more convenient to interpret *tabas* as a recent Latv. loan with Latv. -*s* nativised to -*as*.

C. Erroneous etymologies

54. *laiva* ‘ship’ ~ Lith. *laivas* ‘ship’, Latv. *laiva* ‘boat’ (Donner 1884: 265) or ~ Lith. *plauti* ‘to bathe’ (Liukkonen 1999: 34 Baltic **plauja*). Lith. *laivas* < Latv. *laiva* < Finnic < PGmc **flauja*- (~ Old Norse *fley* ‘raft, ship’, Koivulehto 1970), since the Germanic original is fully documented, unlike its Baltic cognate suggested by Liukkonen.

55. *purje* ‘sail’ ~ Lith. *burė*, Latv. *bura* id. (Thomsen 1890: 124 163–64 Baltic **burjė*). Finnic < Germanic **burja-* (~ Old Norse *byrr* ‘tailwind’, Koivulehto 1970: 182). Most probably the Baltic words are also < Germanic.
56. *laita* ‘(ship) board’ ~ Latv. *laide* ‘butt, stock’, Lith. *nuolaida* ‘allowance’ (Thomsen 1890: 193). No semantic connection. A homonymous Latv. word has a more specific meaning connected to boat building, but it is certainly not a borrowing from Finnic (Kalima 1936: 128).
57. *lautta* ‘float, ferry’ ~ Lith. *plaustas* ‘float, raft’ (Liukkonen 1999: 34). Liukkonen suggested a borrowing before the change **d-d* > **zd*, which, however, had already started in PIE (Meyer-Brügger 2010: 268).

Group X. Textiles and weaving, clothing and shoes.

A. Relatively clear etymologies

58. *niisi* ‘heddle’ ~ Lith. *nytis*, Latv. *nītis* pl. id. (Weske 1890: 215).
59. *vuota* ‘pelt, hide’ ~ Lith. *oda* ‘bark, leather’, Latv. *āda* ‘skin, fell’ (Thomsen 1890: 205).
60. *kypärä* ‘helmet; (Est.) hat’ ~ Lith. *kepurė*, Latv. *cepure* ‘hat’ (Thomsen 1890: 185).
61. *kinnas* ‘glove’ ~ Latv. *cimds* id. (Lule Saa *kamtes* < Finnic < Baltic **kimdas*, Thomsen 1890: 187).
62. *kurpponen* ‘winter shoe’ ~ Lith. *kurpė*, Latv. *kurpe* ‘shoe’ (Donner 1884: 269). The Finn. *-rpp-* is the result of a secondary lengthened < *-rp-*, attested in dialects.

B. Dubious etymologies

57. Liv. *vērbikšõ*, Veps. *bärbitada* ‘to spin’ ~ Lith. *verpti*, Latv. *vērpt* id. (Thomsen 1890: 141 240 Liv., Posti 1946: 386 Veps). In any case, this is not the earliest word for spinning in Finnic, since *kehrätä*, a Finnic–Saamic–Mordvinic verb, is of Aryan origin (Koivulehto 1979b)
58. *verho* ‘curtain, cloth, Est. *võru* ‘ring, hoop, bond’ ~ Lith. *veržti* ‘to screw, tighten, tie together’ (Baltic **verža*, Thomsen 1890: 241). It is questionable whether there is any connection between the Finn. and Est. word. An appropriate Baltic derivative is missing.

C. Erroneous etymologies

58. Liv. *kȭidaz* ‘weaver’s reed’ ~ Lith. *skietas*, Latv. *šķiets* id. (Thomsen 1890: 141). Cf. C33.
59. *mytyri* ‘kind of headwear’ ~ Lith. *muturas* ‘kind of headscarf’ (Toivonen 1917a: 87). This obsolete Finn. word is an *i*-stem without any Finnic cognates, and thus a recent loan from Scandinavian (~ Old Norse *mitr* ‘miter’, Toivonen 1917a: 87).
60. Est. *kulit* ‘pocket’ ~ Latv. *kule* ‘bag, sack’, Lith. dial. *kulis* ‘testicle, bag’ (Saareste 1922: 141). The Est. word is a recent borrowing from a Latv. diminutive *kulīte*, since Latv. *kule* < Russ. *kul'* (Endzelīns 1925–27: 306).
61. Est. *kaugas* ‘pocket’ ~ Latv. *kabata* id. (Uibo 2010: 758–59). Implies very improbable, complex phonological processes
62. *nartsu* ‘rag’ ~ OPr. *northe*, *nurtue* ‘shirt’ (Vaba 1998: 178–80). A recent word, as revealed by the consonant cluster -*rts*-.
63. Est. *vanik* ‘wreath, garland’ ~ Lith. *vainikas* ‘crown, wreath’ (Thomsen 1890: 235). The first syllable vowels do not correspond; a Slavic origin (Polish *wianek* ‘crown’) could be possible, possibly mediated by Baltic Germanic?

Vaba (2011a: 757) seems to suppose that Finnic *kelta* ‘Diphasiastrum complanatum, some other yellow plants; yellow colour’ has been borrowed from Baltic as a name for the above-mentioned plant, traditionally used for the dyeing of fabrics, and that the name of the colour has been derived from it. This is not in any way granted, since only Latv. *dzelta* has the dialectal meaning of ‘Diphasiastrum complanatum’, whereas Lith. *gelta* is simply ‘yellow colour’. Thus no innovation has to be combined with the borrowing.

Group XI. Construction

A. Relatively clear etymologies

63. *lauta* ‘board’ ~ Lith. *plautas* ‘kind of table’, Latv. *plauts*, *plaukts* ‘shelf’ (Thomsen 1890: 209)
64. *malka* ‘roof batten’ ~ Lith., Latv. *malka* ‘firewood, splinter’, OPr *malko* ‘wood’ (Donner 1884: 267)
65. *seinä* ‘wall’ ~ Lith., Latv. *siena* ‘wall; border’ (Thomsen 1869: 34)
66. *uksi* ‘door’ ~ Lith. *uoksas* ‘hollow’ (Koivulehto 1993: 34)
67. *sakara* ‘cusp, lobe; hinge’ ~ Lith. *stagaras* ‘dried up plant stem or branch’, cf. Serbian *stožer* ‘hinge’ (Kalima 1936: 203).
68. *huone* ‘room, building’ ~ Lith. *šonas*’cheek; side’, Latv. *sāns* ‘side’ (Koivulehto 1992: 169–75). The original Finnic meaning should be ‘annexe’.
69. *silta* ‘bridge; floor’ ~ Lith. *tiltas*, Latv. *tilts* ‘bridge’ (Budenz 1873: 98)
70. *lava* ‘stage, platform’ ~ Lith. *lova*, Latv. *lāva* ‘plank bed’ (Wiklund 1896: 45–46)

B. Dubious etymologies

59. *hirsi* ‘log, building timber; (Est.) pole, perch, rail’ ~ Lith. obs. *žardis* ‘long pole’ (Nieminen 1945: 531–33 Baltic **žirdis*). A Baltic apophonic variant with **ir* required for the etymology is not attested. Another possibility is a very old Slavic loan (~ PSl **žrъdь*, cf. Russ. *žerd′* ‘pole’), and it is not excluded that also Lith. obs. *žardis* is a borrowing from the same stem (preferably from Belarusian, see Nieminen 1949: 110).
60. *sii* ‘eaves beam’ ~ Lith., Latv. *sija* ‘bar, beam’ (Nieminen 1963 Baltic (Curonian) **sije*). The Finnic word has also been proposed cognates in Saa, Permic, and Samoyed (see SSA III: 175).
61. *sammas* ‘column, pole, cairn’ ~ Lith. *stambas* ‘plant stem’, cf. Sanskrit *stambhaḥ* ‘column, pole’ (Būga 1908: 27–28). Kalima (1930) explains the Finnic word from Aryan.
62. *talas* ‘boathouse; (Est.) scaffolding’ ~ OPr. *talus* ‘floor’, Lith. *patalas* ‘(made up) bed’ if not < PGmc **stallaz* (Hofstra 1985: 102) or = PPermic **tulys* (~ Udmurt *tylys* ‘hut, tent’) < PAryan **tala*- (Joki 1973: 324–25).
63. Est. *keris* ‘pile of stones in top of an oven or sauna stove’ ~ Latv. pl. *ceri*, *ceras* ‘oven stones’ (Vaba 1996a). It is hard to decide the direction of borrowing, since both the Latv. and Est. words have possible cognates (Latv. *ceri* ~ *cerēt* ‘to hope’ and Est. *keris* ~ Komi *gor* ‘oven’). A later loan Latv. > Est. is also possible, since *keris* has a recent stem form -*ise*- and the initial *k*- may be due to etymological nativisation.
64. *sarana* ‘hinge’ ~ Lith. *sąnarys* ‘joint’ (Liukkonen 1999: 127–28). Finnic *sarana* has also been connected to some Permic and Ugric words (see SSA III: 158).

C. Erroneous etymologies

64. Est. dial. *karts*, *kartsas* ‘ladder’ ~ Lith. pl. *gardys* id. (Nieminen 1959: 209). Certainly a later loan < Latv. dial. *kārde* id. because of the cluster -*rts*-.
65. *aitta* ‘granary’ ~ PBa **aitā*, a form reconstructed by Lidén (1911: 198–202) based on Slavic forms like Polish *jata* ‘granary’. Lidén analysed Lith. *aitvaras* ‘kite; evil spirit’ as **ait-varas* ‘granary-guard’, but it can also be interpreted ← **ati-varyti* ‘to chase away’ (Smoczyński 2007: 5); thus, there is no undisputed Baltic evidence of **aitā*. The Finnic word has a relatively recent sound structure -VVCC-.
66. *aita* ‘fence’ ~ Lith. *eiti* ‘to go’ (Liukkonen 1999: 20–21 PBa **aitā*). The Baltic derivative is hypothetical and the semantic distance is long. Finnic ? < PGmc **aiđa*- ‘strait’ (LÄGLOS I: 17–18) if not = Khanty DN *o′t* ‘type of fish weir’, as proposed by Janne Saarikivi in a private message.
67. *pirtti* ‘cottage; sauna; kitchen’ ~ Lith. *pirtis*, Latv. *pirts* ‘sauna’. (Thomsen 1869: 83). Finnic < Slavic, cf. Old Russ. *pьrtь* ‘bathhouse’ (Nieminen 1953) because of the sound structure -rCC- and the distribution of the word: in Southern Finnic, it occurs only as a Finn. loan in Est. *pirt* ‘Dianthus deltoides’, but the Russ. word has been borrowed even in Mari and Chuvash.

68. *hulas* ‘timber joint, round edge over hollow point, shelter in front of a building’ ~ Lith. *šulas* ‘pillar; beam; building timber’ (Nuutinen 1984). Smoczyński (2007: 651) explains the Lith. word as a loan from Polish *szuło* ‘wooden pole’ and the Germanic etymology for Finnic *hulas* (PGmc **hulaz* ‘hollow’, Toivonen 1944) seems acceptable.

Apart from A63–64 and B59–62, several different names for laths, slats, sticks and poles could be included to this group: *aarto*, ?*hako*, ?*hara*, *kärväs*, ?*maila*, *orsi*, ?*pahla*, ?*parsi*, *seiväs*, ?*vanko*, ?*varras*, ?*varsi*, ?*varsta*, Est. ?*matar*, *sugar*, *tuber,* and ?*tõlv*. However, they are extremely difficult to combine with a certain technological level due to their versatility and the simple design of the items denoted.

Vaba (2011a: 754) has amplified the semantic group of building and technology by some words originally denoting something not belonging here. The original meaning of *kohta* ‘place, spot’ must be ‘front’ to be combinable with Lith. *kakta* ‘forehead’, Latv. *kakts* ‘nook’ (Uotila 1985). *Rako* ‘slit, gap’ (~ Lith., Latv. *spraga* id., Thomsen 1890: 219) and *vaaja* (B68) do not have to be borrowed as construction words, and *riitta* ‘pile, stack (of wood)’ is neither a construction word nor a Baltic borrowing.

Group XII. Other

A. Relatively clear etymologies

71. *hihna* ‘belt, strap’ ~ Lith. *šikšna*, Latv. *siksna* ‘leather’ (Donner 1884: 266 = Md *kšna* id.)
72. *kela* ‘reel, spool’ ~ OPr. *kelan* ‘wheel’ (Thomsen 1890: 185)
73. *kirves* ‘axe’ ~ Lith. *kirvis* id. (Thomsen 1869: 80)
74. *lapio* ‘shovel’ ~ Lith. *lopeta*, OPr. *lopta* id. (Donner 1884: 266)
75. *luuta* ‘broom’ ~ Lith. *šluota*, Latv. *slota* ‘broom’ (Donner 1884: 266)
76. *kauha* ‘ladle’ ~ Lith. *kaušas*, Latv. *kauss* ‘basket, bucket, scoop’ (Donner 1884: 264)
77. *kannel* ‘kind of harp’ ~ Lith. *kanklės*, Latv. *kokle* id. (Thomsen 1890: 178–81)
78. SEst. *välmäs*, *välm* ‘hank’ ~ Lith. *velti* ‘to felt, full, tousle, ruffle’, Latv. *velt* ‘to roll’ (Vaba 1994: 245 < Baltic **velma*-).

B. Dubious etymologies

65. *kampi* ‘crank’ ~ Lith. *kampas* ‘angle, corner’ (Leskien 1891: 214). Another possibility is < Germanic **hamfaz* (~ Goth. *hamfs* ‘mutilated, maimed’, Toivonen 1917b: 12–17). An earlier suggestion ~ Lith. *gembė* ‘bracket, holder’ (Donner 1884: 269) is not correct.

66. *lasta* 'spatula, shake; (Est.) bar connecting wagon axles' ~ Lith. *lazda* 'stick; hazel', Latv. *lagzda*, Opr. *laxde* 'hazel'. As a highly durable and elastic material, hazel wood has been used to make several utensils; the semantic connection is still somewhat unclear.
67. *pauna* 'bag' ~ Latv. *pauna* 'bundle, pack' (Kalima 1936: 146). The IE etymologies proposed for Latv. *pauna* (see Kiparsky 1959: 424) are not semantically satisfactory. Thus the direction of borrowing is unknown. Since the Finn. word is most probably < Est., a recent borrowing from Latv. is also possible.
68. *vaaja* 'wedge' ~ Lith. *vagis*, Latv. *vadzis* 'crook, hook' (Thomsen 1869: 156). It is impossible to decide, whether the Finnic word is from Baltic or Germanic, since the PGmc form **waγja*z is almost identical to PBa **vagjas*.
69. *talpa* 'wedge, cleat' ~ C6 (Koponen 1998: 182). Since Finn. *talpa* < Est. *talb* id., the Est. word could be < Latv. Semantically, the Lith. and OPr. forms may be closer to Finnic.
70. Kar. *ola* 'silicon' ~ Lith. *uola* 'cliff, rock', Latv. *ola* 'egg, round stone' (Toivonen 1952: 30–31 = Mord. *al* < Baltic). Another possibility is < PAryan **ola*- 'ball, round stone' (see SSA II 262–63).
71. *rauta* 'iron' ~ Lith. *rauda* 'ruddiness, red colour'(Wiklund 1896: 142–43). The older and better-known etymology ~ PGmc **rauđa*- 'red' (Thomsen 1869: 143) is as well justified.
72. *karta* 'sheet metal' ~ Lith. *skarda*, Latv. *skārds* 'tin plate' (Donner 1884: 265). This etymology would be of great historical interest if it were the only sure Baltic loanword witnessing a use of metal, since *viikate* (B22) and *rauta* (B71) are considered dubious. However, *karta* could be alternatively combined to Germanic **skarda*-: cf. Old Frisian *skerd* 'section, piece' ← Germanic **skeranan* 'to cut'. Even the Baltic words may be < Germanic, if they are not derivable from the same IE stem (Lith. *skirti* 'to cut').
73. SEst. *kuvvas : kuuda* 'axe shaft' ~ Lith. *kotas* 'stem; handle, shaft', Latv. *kāts* id. (Thomsen 1890: 190). Nieminen (1959: 202) links the first syllable **ū* to a recent Latgalian origin, but it is unclear if there is any Latgalian influence on SEst.
74. *suola* 'salt' ~ Latv. *sāls* id. (Būga 1980: 131 Baltic **sālā*). In principle, the Finnic word may be older and related to Md and Permic words (Erzyan *sal*, Komi *sol,* etc.), but this necessitates an irregular sound correspondence (see SSA III: 215); i.e. the Baltic explanation is phonologically the most suitable.
75. *terva* 'tar' ~ Lith. *derva*, Latv. *darva* id. (Thomsen 1869: 152 = Saa *tarve*). Again, the Baltic stem has a PGmc cognate **terwō*- as an equally good source for the Finnic word.
76. SEst. *täüdäs* '(birch) tar' ~ Lith. *degutas*, Latv. *deguts* 'tar' (Ojansuu 1921: 38 Pre-Latv. **degutas*). The absence of *-*g*- in the SEst. word is somewhat hard to explain.

C. Erroneous etymologies

69. *latu* ‘ski track’ ~ Lith. *latakas* ‘duct, passage’ (Sammallahti 1977: 124 = Mari *laδə*). The Lith. word is a loan from Belarusian, see Smoczyński 2007: 338.
70. *turku* ‘market’ ~ Lith. *turgus* id. (Thomsen 1869: 88).) Finnic < Slavic *tъrgъ* (Thomsen 1890: 127).
71. *rahko* ‘splinter holder’ ~ Lith. *raška* ‘apple picking stick’ (Liukkonen 1999: 114). The original meaning of the Finnic word is evidently ‘forked’ (Nilsson 2001: 185).
72. SEst. *palask* ‘worn out thing’ ~ Lith. *peilis* ‘knife’ (Vaba 1988: 183). The words do not match phonetically or semantically.
73. *suka* ‘currycomb’ ~ Lith. *šukos* ‘comb’ (Thomsen 1890: 226) is a possible combination (Kallio 2009: 32) but the borrowing must be earlier than Baltic (i.e. Pre- Baltic, Proto-Balto-Slavic or Western Indo-European) because of the Finnic *s*-.

There are two words distributed in Northern Finnic variants which have a proposed Baltic origin, but their phonology makes it impossible to situate them in the ancient loanword layer: Finn. *puusniekka* ‘husband living in wife’s parents’ household; stepfather’ (Būga 1980: 22 ~ Lith. *pusininkas*, Latv. *pusenieks* ‘co-owner of land’) and Kar. *tšiitalo* ‘leftover animal fat’ (Kalima 1941: 209 < Pre-Latv., cf. Latv. *cīkstalas* id.). These could be connected with stems such as *kirstu* ‘coffin’ and *kousa* ‘large drinking cup’, which originate from Baltic languages but have spread through the region through mediation by Russ., Germ., or Swed.

Conclusion

To sum up, the context of the old Baltic contacts remains one of the key questions with regard to the prehistory of not only Finnic and Baltic, Saami and Mordvinic, but also Northern Indo-European as a whole. The key issue when studying the context is, in turn, the semantics of the loanwords, a matter still involving many open questions. A great part of the etymologies have not been critically evaluated yet, and a conclusive research on their context in the history of innovations should be performed as a co-operative endeavour involving all disciplines studying prehistory.

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Baltic loanwords in Mordvin

Linguists have been aware of the existence of Baltic loanwords in the Mordvinic languages Erzya (E) and Moksha (M) since the 19th century. However, the analysis and interpretation of individual etymologies and the contacts between these two language groups have been ambiguous, as the assumptions on the place and age of the contacts have changed. The assertions on the prehistoric development and early language contacts between the Finno-Ugric (Uralic) and Indo-European languages have changed as well. The main evidence concerning early Baltic loanwords in the Finno-Ugric languages is drawn from the Finnic languages, which are located geographically further west relative to Mordvinic. The high number of early Baltic loanwords in the Finnic languages suggests that the most intensive contacts took place between the early varieties of the Finnic and Baltic languages and did not influence other Finno-Ugric languages to the same extent. In principle, the continuity of these contacts extends until the modern era and very recent contacts between Estonian, Livonian, and Latvian that are geographical neighbors and documented languages with a concrete geographical distribution, historical and cultural context.

The Baltic influence on the Saamic and Mordvinic languages was much less intensive, as evidenced by the considerably lesser number of loanwords. Moreover, the majority of Baltic loanwords in Saamic are attested in the Finnic languages as well, whereas the early Baltic influence on the Mordvinic languages diverges from that on the Finnic languages. We assume that there were parallel contacts between prehistoric Baltic and Finnic and Baltic and Mordvinic languages and, in the light of what follows, these contacts took place independently of one another.

The current article scrutinizes the etymological data labeled as Baltic loanwords in Mordvinic and suggests that, although several proposed lexical comparisons between the Baltic and Mordvinic languages are incorrect, the number of plausible and possible etymologies, nevertheless, is more than thirty. The etymological data include nine new etymologies (E M *karks* ‘belt’ etc., E *keřš*, *kerč*, M *kerďži*, *keŕži*, etc. ‘left’, E *penge*, M *pengä* ‘log, firewood’, E *raśke*, M *raśkä* ‘relative, friend’ etc., E *ŕeďams*, *ŕäďams*, M *ŕäďams* ‘notice, perceive’ etc., E M *rudas*, *urdas* etc. ‘dirt, mud’, E M *talaj* ‘recently, lately’ etc., E *ťeŕďems*, *ťäŕďems*

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etc., M *t́eŕd́əms* ‘call; invite’, E *viŕ*, M *viŕ*, *viŕä* ‘forest’). The data are used to reconcile the order and possible age of certain historical sound changes in Mordvinic and its earliest reconstructed variety Pre-Mordvinic, the ancestral form that bridges Proto-Mordvinic with Proto-Finno-Ugric (PFU) and Proto-Uralic, the shared proto-languages of present-day Finno-Ugric languages. In this article, the term Finno-Ugric will be used instead of Uralic, as the terminological distinction between these two concepts is not important for the given topic.

1. Introduction: The identification and characterization of Baltic loanwords in Mordvin

The main instigator of modern research into early Baltic and Germanic loanwords in the Finnic languages was Vilhelm Thomsen, the famous Danish linguist and one of the most quoted specialists of this research area ever since. The existence of Baltic loanwords in the Finnic languages had been noticed already before Thomsen, but the conclusions mainly remained at the level of more or less random comparisons between individual words followed with other misinterpretations. There were contemporary linguists who worked parallel with Thomsen; however, he created a more systematic path for loanword research (Junttila 2009).

More recently, Wälchli (1997) and van Pareren (2008) have carefully investigated linguistic, onomastic, and archaeological references to contacts between Baltic and Mordvinic languages (cf. also the surveys of Stipa (1973b) and Vaba (1983a, 1983b)). Wälchli suggests several new etymologies and assumes that in addition to normal lexical borrowing, words with grammatical functions in Mordvin were actually borrowed, too. Van Pareren’s article includes and quotes numerous etymologies that were proposed as Baltic borrowings in Mordvinic. The current paper seeks to shed more light on a sound historical analysis of individual etymologies.

Thomsen and his contemporaries, most notably Wilhelm Tomascheck, were the first ones who could systematically demonstrate the existence of Baltic loanwords in Mordvinic (BLM). Thomsen played a seminal role in the rise of historical linguistics and etymology based on the neogrammarian method. He adapted loanword stratigraphy into prehistoric processes and assumed that BLM were adopted into Mordvinic independently of the Baltic influence on the Finnic languages. Furthermore, he concluded that the Mordvins or an adjacent tribe such as the Muromians had earlier lived further westward from the historical core area of the Mordvins (Thomsen 1890: 153–155). The contribution of Thomsen was seminal, because he actually presented all possible logical conclusions and laid the foundation for subsequent studies in this area. Since Thomsen, two other competing views have got more attention in references considering BLM. Firstly, it has been assumed that the contacts took place in parallel, and secondly, it has been maintained that the Baltic loanwords were adopted at a common proto-language stage of the Finnic and Mordvinic languages.

Thomsen's hypothesis that the Finnic languages transferred the Baltic loanwords to Mordvinic was repeated later as well (Kalima 1936: 191–192; Nuutinen 1987: 524; Sammallahti 1977: 123–124; Vaba 1985: 139). Furthermore, it was assumed that the contacts between Baltic and Finnic used to be intensive, whereas contacts between Baltic and Mordvinic were more occasional. It was concluded that the contacts between present-day Baltic and Volgaic languages were hardly possible and the loanwords were adopted from a transferring language. For example, it was suggested that a lost Finno-Ugric language, such as the language of the Merya people, transferred Baltic loanwords to Mordvinic (Kalima 1936: 192; Keresztes 1987: 41–42).

The assumption that Baltic loanwords in Finnic and Mordvinic originate from shared contacts is considered unlikely by many scholars for two main reasons, namely, phonological ambiguity and uneven lexical distribution. It is difficult to combine phonologically those few Baltic loanwords that occur both in the Finnic and Mordvinic languages, because the sound correspondences diverge from that of inherited Finno-Ugric vocabulary. The shared words have different reconstructions in Finnic and Mordvinic. Consequently, there presumably were direct contacts between Mordvinic and Baltic (Kalima 1936: 192; Keresztes 1987: 41–42; Suhonen 1988: 613–614; Vaba 1983b: 141–142; 1988: 181). In fact, Kalima (op. cit.) in expressis verbis assumed that there used to be contacts between the Galinds (Russian *goljadʹ*), a Baltic tribe mentioned in early historical texts on Russia during the Middle Ages, and the Mordvins. This conclusion was recently revisited by van Pareren (2008) and allows a further hypothesis that there probably were many contact areas between Uralic and Baltic languages in Russia, as assumed by Vasmer (1932: 635–636) and Vaba (1983b: 139).

There have been diverse views concerning the actual number of Baltic loanwords in Mordvinic. In general, most loanwords occur in both Mordvinic languages, but some of them are attested only in Erzya. During the second half of the 20th century, the estimation that there are roughly ten Baltic loanwords, as suggested by Kalima, was probably the most frequently quoted number by other linguists (Bartens 1999: 15; Kalima 1936: 191; Korhonen 1981: 30; Suhonen 1988: 614; Zaicz 1998: 213). Vaba (1985) assumes in a conference abstract that there are roughly twenty plausible Baltic loans in Mordvinic. Furthermore, he estimates that 10–15% of all early Baltic loanwords in the Finnic languages have a cognate in the Volgaic languages.

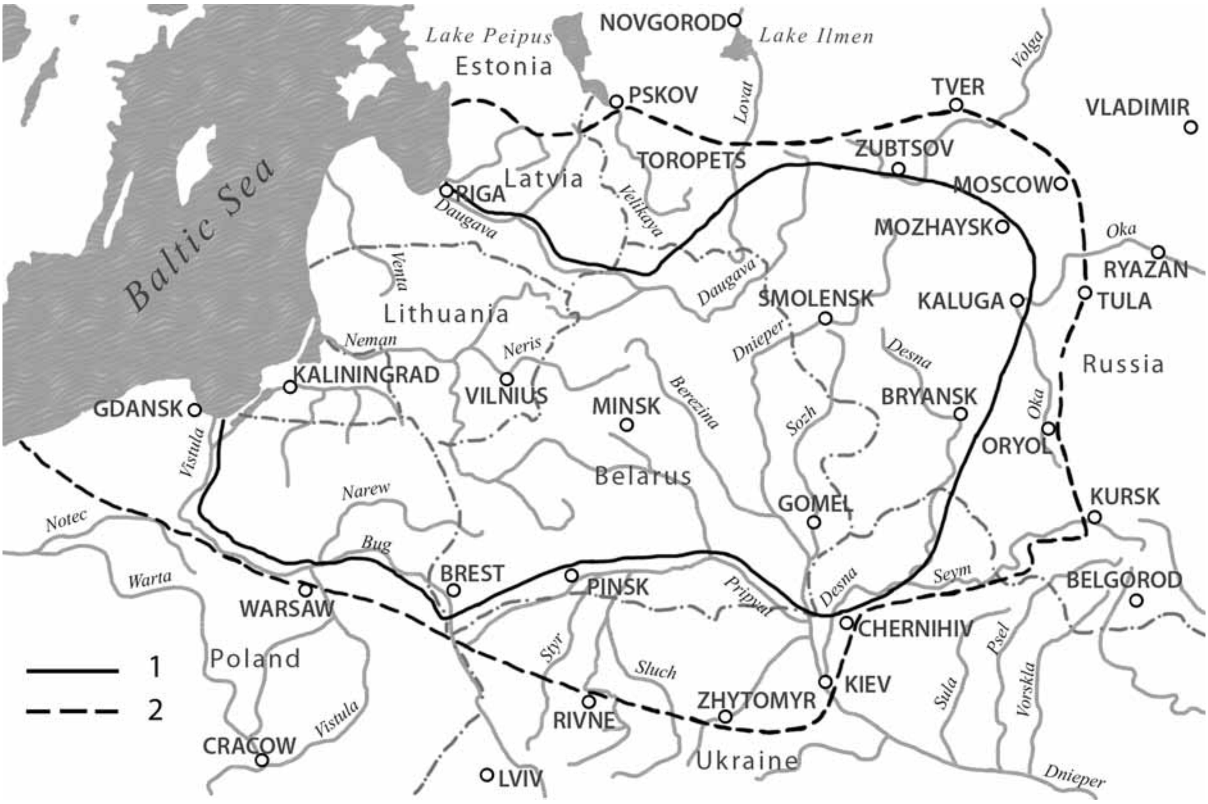
2. The eastern distribution of the Baltic languages

The historical distribution of the Baltic languages in Central Russia is evidenced by historical sources referring to tribes and place names considered to be Baltic. The first Russian chronicles include lists of various peoples living in Russia paying taxes to the rulers. The texts are usually taken as a written document concerning the existence of the isolated Baltic tribes, the Galinds and Vyatiches, on the upper flow of the Oka after the beginning of the Slavic invasion in the early Iron Age and as late as the 11th and 12th century. The geographical distribution of the hydronyms of the assumed Baltic area on the upper flow of the River Dnepr and its tributaries is much larger. This hypothesis of a high number of place names with Baltic origin was first proposed at the beginning of the 20th century (Būga 1924: 103; Knabe 1962; Vaba 1983a: 80) and later considerably elaborated by Toporov and Trubačov (Toporov & Trubačov 1962; Toporov 1972; Toporov 1981). The conclusions of Toporov and Trubačov were rapidly accepted by their contemporaries and adopted by later researchers (Gimbutas 1983: 24–25; Mallory 1989: 81–84; Otkupščikov 2005; van Pareren 2008; Sedov 1971; Stang 1966: 1–2; Tret'yakov 1966: 184–189, 231; Vlasto 1986: 302, Zinkevičius 1996: 9–14). There have even been attempts to reconstruct the phonological system of the Baltic languages of the same area from the evidence found in place names. In fact, several word stems have cognates in documented Baltic and Slavic languages, which makes it possible to outline certain details of the language of the Galinds and Baltic area on the upper flow of the Dnepr and the Dvina (Lekomceva 1980, 1981).

Basically, the data presented in (Toporov & Trubačov 1962) should be revised in terms of up-to-date theories on the historical relationship between the Baltic and Slavic languages and their common background, as Stang (1966: 2–15) already pointed out. In more recent studies Kallio (2006) and Koivulehto (2006) have assumed a long-term continuity in contacts between the Finnic and Slavic languages similar to the well-argued continuity in the contacts between the Finnic and Germanic languages, as well as the Finnic and Baltic languages. This assumption suggests that the split between the Baltic and Slavic languages is not as old as the difference between other northern branches of the Indo-European languages.

The assumption of Baltic hydronyms in the area extending to the east from the area of the present-day Baltic languages is based on the dissimilarity of the Baltic and Slavic languages at the time the names were adopted. The area includes the upper flow of three important water routes, namely, the rivers Daugava (Zapadnaya Dvina) leading to the Baltic Sea and western Baltic area, Dnepr and its tributaries connecting Central Russia with multinational southern Russia and the Black Sea, and Oka leading first to the Volga and through a more eastern route to Turkic-speaking areas and the Caspian Sea.

The River Oka, a tributary of the Volga, bridges the assumed Baltic areas with the Mordvinic ones, although there is no documented evidence of a very tightly adjacent location geographically for the Baltic and Mordvinic peoples. Nevertheless, the areas are close enough and the Oka water route is important for the Mordvins. In the 19th and 20th centuries, for instance, the geographical distribution of the Mordvinic languages has been limited to the river in the west, a tributary of the Oka. On the one hand, it is assumed that, historically, some Mordvins used to live west from the areas were the language is documented. There are a few historical references to the northernmost Mordvinic tribe, the Teryukhans, who used to live on the shore of the Volga and Oka. Given the local oral tradition that preserved the awareness of their origin, the Teryukhans were assimilated by the Russians only relatively recently (Feoktistov 1975: 253–254;



Map 1. The geographical distribution of Baltic hydronyms in Central Russia (based on Gimbutas 1983: 24–25 and Toporov & Trubačov 1962; revised by Zinkevičius 1996: 12). 1 – the area where there are many such names; 2 – the area where they are few and of ambiguous origin.

Martyanov & Nadkin 1979). Tretyakov (1966: 293–294) speaks more generally about graves of Finno-Ugric tribes on the left side of the Oka labeling them as Muroms. On the other hand, the Oka is considered to be one of the most important Slavic migration routes that brought new inhabitants into the area of the Oka and Volga (Mongajt 1961: 139; Stipa 1973a: 381–383). Thus, the area has been very important for multiple ethnic contacts, due to which Ravila (1973: 305), for instance, is critical of the mutual compatibility between prehistoric cultures and later ethnic groups with documented languages.

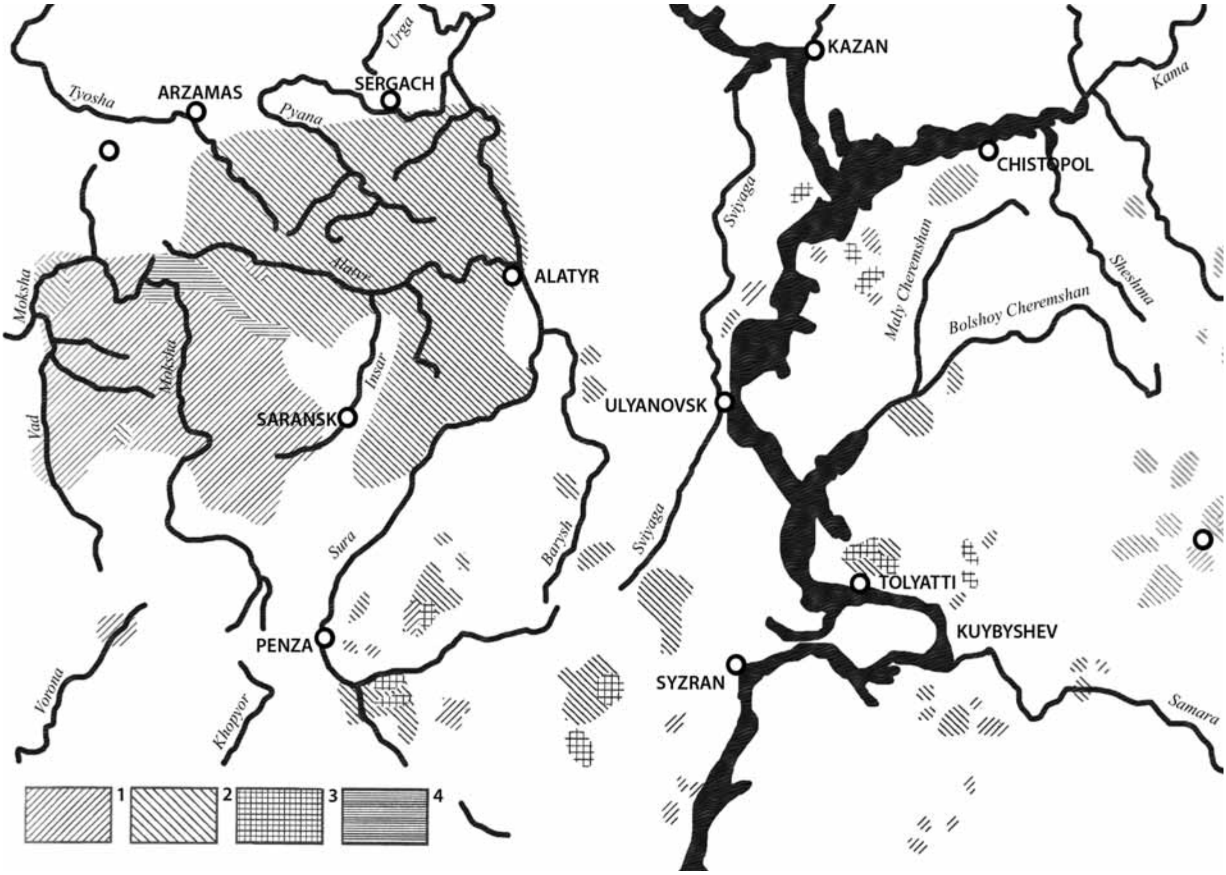
Most of the presented viewpoints assume a relatively late contact between the Baltic and Mordvinic languages, partly motivated by a certain transparency of the alleged Baltic hydronyms of the given area. However, it has also been maintained that, in fact, the Volga-Oka interfluve is a much older contact area between early Indo-European and Finno-Ugric languages and their varieties. In their concise essay on the emergence of early Indo-European and Finno-Ugrian languages in the evidence of prehistoric cultures, Carpelan and Parpola maintain that the late Neolithic Fat’yanovo (starting as early as 2800 calBC) and Volosovo cultures (c. 3650–1900 calBC) represent an early contact zone between Indo-European and Finno-Ugric tribes. They conclude that the language of the Fat'yanovo elites most likely was Pre-Proto-Baltic (cf. also Knabe 1962; Tret'yakov 1966: 111–112), which was preserved in the Balanovo culture (starting 2200 BC) (Carpelan & Parpola 2001: 85–89). The latter is labeled as Indo-European by Tret'yakov (1966: 94).

Furthermore, Carpelan and Parpola claim that two ethnically important concepts that label the Mordvins are adopted during a very early language contact situation. **Mord* (> Russian *Mordva*) < Proto-Aryan *márta*; cf. Proto-Aryan **márya-* < Proto-Indo-European **meryo-* 'man' is first attested as *Mordens* in literary documents c. 550 AD in the history of the Goths by Jordanes. The corresponding appellative is represented in present-day Mordvinic languages as E *mirde*, M *mirdä* 'man' originating from < PFU **mertä* < Proto-Aryan/Old Indo-Aryan *mṛtá-* 'mortal, man'. (Carpelan & Parpola 2001: 111–112.)

Generally speaking, the role of language contacts and the change of lexicon due to foreign influence is not as important in the historical development of Mordvinic as it is in the history of the Finnic languages in the west and Mari and Udmurt, east of Mordvinic. In Proto- and Pre-Mordvinic there is no intensive lexical and grammatical influence comparable to the Germanic and Baltic influence in Proto-Finnic and the Turkic influence in Mari and Udmurt in the Middle Ages. Therefore, the identification and more detailed analysis of the assumed Baltic influence on Mordvinic and other language contacts have more general importance in the identifying of intercultural connections and routes in Central Russia.

Given the general picture of ethnic prehistory in Central Russia and the geographical connection between areas in which the Baltic and Mordvinic languages were historically spoken, it is obvious that there were direct linguistic contacts between Baltic and Mordvinic. (For more detailed discussion on mainly archaeological research on this topic, see Pareren 2009.) We maintain that there were parallel contacts and many contact areas between different Finno-Ugric and Baltic languages and groups, as some linguists have assumed earlier. This conclusion involves several questions that will be only partly addressed in this article.

(i) Do all Baltic loanwords in Mordvinic represent the same chronological layer or is there evidence of long-term contact between these two language groups?
(ii) If Baltic loanwords were borrowed into the Finnic and Mordvinic languages separately, were they borrowed from similar prehistoric Baltic varieties or do they originate from different languages?
(iii) What other contacts were there between the Mordvinic and Indo-European languages and were they chronologically parallel or successive?
(iv) How old are individual Baltic loanwords and what is their relative chronology in comparison to other lexical strata?
(v) At what historical stage of the Mordvinic languages were the Baltic loanwords borrowed?



Map 2. The geographical distribution of the Mordvinic languages in the 20th century. The core area between the rivers Moksha (an eastern tributary of the Oka) and Sura consists of the (1) Moksha and (2) Erzya speaking areas in the republic of Mordovia. (Based on Feoktistov 1990: LIX.)

The lexical corpus analysed below is too small to make detailed conclusions concerning the relationship between the Baltic varieties that have influenced the Finnic and Mordvinic languages. The evidence of place names is also too limited for exact conclusions (Lekomceva 1980, 1981). Furthermore, the phonological constraints and syllable structure of prehistoric Finno-Ugric varieties have caused a strong simplification of the original phoneme clusters in the Indo-European languages, which often prevents the reconstruction of subtle alternation between parallel forms in adjacent languages. It is much easier to trace back changes that originate from clearly different sources. Consequently, the second question (ii) will remain unanswered.

Our basic hypothesis, on the one hand, is that given the undetermined character of the Baltic language, the identification of Baltic loanwords in Mordvinic should take place by means of Proto-Baltic. On the other hand, Proto-Mordvinic is not the best possible solution to point out the corresponding form of a Baltic word in Mordvinic, because it only represents the most recent layer based on the comparison of Erzya and Moksha. Thus, the evidence of Baltic loanwords in Mordvinic will be used to shed light on issues such as questions (iv) and (v). As the concept of Pre-Mordvinic has been used in other studies on the early development of the Mordvinic languages, it will be applied below as well.

We shall next proceed with an overview of the historical development of the Mordvinic languages that will be followed by an overview of some language historical facts concerning other Indo-European loanwords in Mordvinic.

3. The historical development of the Mordvinic languages

The historical development and position of Mordvinic in the Finno-Ugric (Uralic) language family has been interpreted ambiguously. Traditionally, it is maintained that the Mordvinic languages share more vocabulary and grammatical features with the Finnic languages than with more eastern Uralic languages, such as Mari, the Permic languages, Hungarian, Ob-Ugric, and the Samoyedic languages (Bartens 1999: 13; Bereczki 1988: 314; Hajdú 1962: 94–97, 1981: 54; Häkkinen 1997: 162–210; Terho Itkonen 1997: 247–260; Keresztes 1987: 32–43). The frequently quoted and widely accepted phonological reconstruction model of Sammallahti (1988) assumes the existence of intermediate proto-language stages. Methodologically, it actually implies a common proto-language between Finnic and Mordvinic, although there is only very little, if any, lexical evidence of a closer relationship between the Finnic and Mordvinic languages (Grünthal 1996; Häkkinen 1984). Accordingly, the vowel history in Finnic and Mordvinic can plausibly be explained on the basis of mutual comparison (Erkki Itkonen 1946; Bartens 1999: 53–67), as the main evidence of assumed quantitative vowel length correlation in Proto-Finno-Ugric is drawn from Saamic, Finnic, and Mordvinic (Sammallahti 1988).

The difficulty in identifying shared phonological innovations between individual branches has urged some linguists to assume that, in fact, there were no intermediate proto-language stages between the earliest Finno-Ugric (Uralic) proto-language (Proto-Uralic, Proto-Finno-Ugric) and proto-languages of individual branches (Proto-Finnic, Proto-Mordvinic). This hypothesis, however, is methodologically biased and should be scrutinised by analyses that are based on a greater number of mechanisms of language change. (For a more detailed discussion, cf. Grünthal 2007.)

In the case of Mordvinic, it is necessary to assume that regardless of the plausibility of an assumed Finno-Volgaic proto-language there was a long period that can be reconstructed only on the basis of the Mordvinic languages.

Proto-Mordvinic is a relatively recent layer that was preceded by several phonological, lexical, and grammatical changes that are not shared with other Uralic languages. Consequently, Erkki Itkonen (1971–72) and Keresztes (1987), for instance, apply the concept of Pre-Mordvinic, while Bartens (1999) compares Proto-Mordvinic with the assumed Proto-Finno-Volgaic.

The assumption of Pre-Mordvinic is empirically motivated, because those phonological changes that are seen in Proto-Mordvinic and unknown in the earlier Proto-Finno-Ugric layer occurred at this stage. These changes include major shifts in the phonological system, such as the replacement of geminate plosives **kk*, **pp*, **tt* with single ones *k*, *p*, *t*, the combinatorial change of voiceless plosives to voiced ones between voiced phonemes *k* > *g* (in certain cases > *j*), *p* > *b* (> *v*), *t* > *d*. The changes in the vowel system are important, too, and include the loss of quantitative correlation between long and short vowels, changes in the stress system, and the quality of the first syllable vowel. The mechanism of the latter change is compatible with the qualitative change of first syllable vowels in Saamic, because in both cases the change is affected by the quality of the second syllable vowel (Bartens 1999: 54–67; Erkki Itkonen 1946, 1971–72; Korhonen 1981: 79–98). However, it must be noted that these changes are clearly different in Mordvinic and Saamic and took place independently of one another.

There is plenty of lexical and grammatical data that can be presented as additional empirical evidence that supports the assumption of Pre-Mordvinic. The Pre-Mordvinic stage must be understood as a dynamic period, during which the prehistoric language underwent many transitions. As an intermediate stage, Pre-Mordvinic should not be understood as a uniform state, but instead as a relatively long period of independent historical development that very likely can be divided into subperiods. In principle, Pre-Mordvinic could be seen as a ”punctuated equilibrium”, as Dixon (1997) conceptualizes a period limited by periods of innovations. Following Dixon’s model, Proto-Finno-Ugric and Proto-Mordvinic would be the stages of innovation in this case. However, Dixon’s assumption has been heavily criticized for too abductive conclusions on the implications of lexical and grammatical parallels with genealogical diffusion and, thus, not being mutually exclusive (Haspelmath 2004, Ross 2001). The current topic, Pre-Mordvinic, apparently reflects diverse sociolinguistic and contact-induced changes as well, although there is still relatively little information about them.

In the illustrated language historical context, contacts with other languages and data that demonstrate diachronic changes in other languages are indispensable for pointing out more detailed facts in language change. Contacts with various Indo-European languages and lexical borrowings from them have a very important role in the research of the history of the Finnic languages. Contacts between the Finnic and Germanic languages, for instance, show long-term continuity and demonstrate the difference between those Finnic varieties that were influenced at different stages of contacts (see, Kallio in this volume). As Koivulehto (1984, 1999b: 341–351 (1995)) first pointed out, the earliest Germanic (or Pre-Germanic) borrowings were adopted at an early stage that preceded those changes that ultimately led to the rise of (late) Proto-Finnic.

A similar kind of approach opens new possibilities in the research of the history of the Mordvinic languages, although this possibility has not been applied so far. Thus, as mentioned above, the identification and analysis of Baltic loanwords in Mordvinic has special importance both for the discussion of ethnic prehistory in Central Russia and the uncovering of the history of the Mordvinic languages. The next section will briefly discuss the evidence of early Indo-European borrowings in Mordvin in comparison to inherited Finno-Ugric (Uralic) vocabulary.

4. The relative chronology of language contacts between early varieties of the Mordvinic and Indo-European languages

The influence of language contacts on the Finno-Ugric languages of Scandinavia and North and Central Russia is far from uniform, in terms of the space, time, and intensity of these contacts. If we ignore the intensive Russian influence in the modern era, the Mordvinic languages yield much less Turkic influence than what is found in Mari and Udmurt, whereas Baltic and Germanic (Scandinavian), the northeastern branches of the Indo-European language family, have strongly influenced the Finnic and Saamic languages. The constant ethnic restructuring of the Middle Volga area during and since the Middle Ages has left identifiable traces in Mari and the Permic languages beginning with early Old Bolgarian influence that gradually transforms to Chuvash and Tatar influence followed by mutual contacts and the currently ubiquitous Russian influence.

The historical development of the Mordvinic languages seems to be more independent of large-scale contact-induced change in prehistoric times than for other Finno-Ugric languages mentioned above, although it is well-known that some early Indo-European borrowings occur only in the Mordvinic languages (Joki 1973; Koivulehto 1999a: 216–231) and new etymologies can be suggested (cf. Grünthal 2001, 2002). There are several reasons for this. For instance, it can be assumed, as Carpelan and Parpola do, that other language groups first met these migrant groups and tribes that ultimately caused large ethnohistoric changes in the inherited Mordvinic areas or their immediate vicinity (Carpelan & Parpola 2001). It is also likely that the prehistoric Mordvinic-speaking community was sociolinguistically relatively strong, more resistant against random linguistic innovations, had a stable population size, and was not as sensitive to sudden changes in the shared language as is the case with sociolinguistically fragmented and small minority communities.

Table 1 illustrates the relative chronology of the historical development of the Mordvinic languages and the influence of language contacts at its different stages.

Modern Erzya and Moksha	Intensive Russian influence Local contacts with Turkic languages
Early divergence between Erzya and Moksha	Local contacts between Mordvinic and Turkic languages Early Slavic influence
Proto-Mordvinic	Late Baltic influence
Pre-Mordvinic	Early contacts with Baltic and Iranian languages Proto-Indo-Iranian influence
Proto-Finno-Ugric (~ Proto-Uralic)	Early Proto-Indo-Iranian and Proto-Indo-European influence

Table 1. The influence of language contacts on the historical development of the Mordvinic languages.

We maintain that Proto-Mordvinic is a relatively late stage, a terminus post quem that preceded the diverging of the two modern Mordvinic languages in individual branches. Pre-Mordvinic, in turn, represents a period that separates Proto-Mordvinic from a shared proto-language with other Finno-Ugric languages, during which lexical and grammatical innovations are no longer shared with other Finno-Ugric languages (Erkki Itkonen 1971–72, 1981: 36–40; Grünthal 2007: 116). Thus, Proto-Mordvinic and Proto-Finno-Ugric are the two edges that distinguish between those two layers that can be established on the basis of comparative evidence.

As regards the current topic, the Baltic loanwords in Mordvinic, the etymological analysis below shows that it is possible that their age varies chronologically. However, in most cases those phonological changes that took place before Proto-Mordvinic have affected the Baltic loanwords just as they have in the case of old inherited vocabulary. Thus, it is often necessary to use the concept of Pre-Mordvinic in the reconstruction of phonological changes and individual etymologies.

In the analysis of possible Baltic loanwords in Mordvinic, the main point is that, as a rule, they share the main phonological innovations, such as the loss of long vowels, the vowel shift that is affected by the quality and stress of second-syllable vowel, and the rise of the opposition between voiced and voiceless plosives instead of geminate and single plosives. So far, the evidence of loanwords has been taken into account in the analysis of Mordvinic language history to some but not a very large extent. Erkki Itkonen (1971–72: 46), for instance, assumes that, on the one hand, E *(k)šna*, M *šna* ‘strap’, one of the oldest attested Baltic loanwords, demonstrates that the reduction of the first-syllable closed vowel followed by a stressed second-syllable open vowel could take place at a very early proto-language stage. In this case the development is parallel with that of E M *skal* ‘cow’ < **uskala* ‘cow’ (> Mari *uškal* id.). On the other hand, Erkki Itkonen (op. cit. 46) notes that the reduction of a closed vowel in the unstressed syllable occurs in words, such as Moksha M *krda* ‘time, occasion’ and *trva* ‘lip’, with a restricted distribution in Mordvinic. (The forms presented in H. Paasonen’s *Mordwinisches Wörterbuch* are E *kirda*, M *kə̑rda* (*krda* is not mentioned) and E *turva*, *torva*, M *tə̑rva*, *trva*, *turva* (MdWb 763–764, 2354).) Furthermore, the same change is attested in Russian loanwords, as demonstrated by E *života*, *živata*, M *švata*, *šəvota*, *živata* etc. (MdWb 2700). Consequently, the only thing that can be concluded on the relative age of Baltic loanwords is that they were adopted earlier than the reduction of the first-syllable vowel took place and, ultimately, the reduction of the unstressed vowel and the shift of the stress of the second-syllable vowel is not a very old phenomenon.

The phonological changes are so regular in the Mordvinic languages that phonological criteria can be used against incorrect hypotheses. Mordvinic E *ardoms, ardums*, M *ardə̑ms* ‘drive; ride; trot’ (MdWb 59–61), for instance, resembles phonologically the Baltic word Lith. *ardýti* ~ Latv. *ārdīt* ‘separate, part, divide’ ((Fraenkel 1962–65: 15–16; Karulis 1992 I: 75)) but cannot be a Baltic loan for phonological reasons, if it were possible to explain the semantic difference. The expected Pre-Mordvinic correspondence of Proto-Baltic **ardī-* would be PreMd **arti*. This would lead to **ord́oms*, as present-day *o* corresponds to PFU **a* in the Mordvinic word *śov* ‘clay’ while followed with *i* in the second syllable (< **śavi* > Finnish *savi* id. etc. (SSA 3: 162; UEW 468)). In fact, this comparison is not very plausible semantically either. Moreover, the Mordvinic word has a more plausible alternative etymology, since Pre-Mordvinic **arta-* neatly corresponds to Indo-Iranian **arda-*, cf. Old Indian *árdati* ‘flow; make restless’, *r̥dáti* ‘scatter, split’ Old Indian (reduplicative present tense) *íy-ar-ti* ‘make moving’, Avesta *ar-* ‘make oneself move, arrive’ < PIE **er* (Pokorny 1959: 326–330).

There are several other Mordvinic words that were occasionally labelled as Baltic loanwords. If they have a better alternative etymology, such as E M *sod* ‘soot’ (MdWb 1999; cf. Joki 1973: 145 and Pareren 2008: 121–123) and are mentioned with relevant literature elsewhere, they will not be commented on here. These words are not included in the etymological list below, although some proposed etymologies deserve a note explaining the grounds on which they were refuted. Suffice it to bring a couple of examples, here.

Wälchli (1997: 310–311), for instance, proposes that M *kaldas* ‘(cattle) yard; (cattle) enclosure’ (MdWb 617–618) is a Baltic loanword. However, in MdWb (MdWb 617–618), M *kaldas* has the same entry as E *kardas* (see the list below). Secondly, the Latvian word *galds* ‘a chopped piece of wood, a cleft board; table’ does not semantically correspond to the Moksha Mordvin word at all. In semantic parallels, such as Lith. *núogalda* ‘(box) stall’, Latv. *aizgalds* ‘pen (for animals)’, the similarity is caused by a Latvian prefix and, consequently, is not a semantic property of the lexical stem. Finally, the word is a Russian loanword, cf. *kalda*, *kaldas* ‘(cattle) yard; (cattle) enclosure’ (Vasmer 1986 2: 166).

The comparison of E *ľej*, *ľij*, M *ľäj*, *ľej* ‘river, ravine’ (MdWb 1099–1100) with Lithuanian *líeti* ‘pour, spill’ etc., a random comparison suggested by Gordeyev (1967: 183), is not plausible on phonological and semantic grounds. No corresponding noun stem has been indicated in Baltic. An internal reconstruction of the Mordvinic word would suggest PreMd **läki* or **läji*. As a rule, the word structure of the Baltic borrowings is clearly reflected in Mordvinic. As a topographic noun E *ľej*, *ľij*, M *ľäj*, *ľej* 'river, ravine' is very widespread in the Mordvinic language area and it occurs frequently as the head of compound place names (Maticsák 1995: 41–49).

5. Space and time of contacts between Mordvinic and Baltic

The prehistoric distribution of the Baltic languages in the upper flow of the rivers Dnepr, Dvina, Oka, and Moskva is well demonstrated in the light of place names. A more detailed analysis of the onomastic data, most notably the seminal work of Toporov and Trubačev (1962), gave a push to Russian dialectology and areal research. Less attention has been paid to areal contacts and the relationship between different languages.

The Finno-Ugric languages were presumably spoken on the eastern and northern side of the Baltic-speaking area. The evidence has been drawn mainly from place names and includes at least the Slavicized present-day oblasts of Jaroslavl', Kostroma, Ivanovo, and Vladimir that are repeatedly labeled as the prehistoric Merya area (Ahlqvist 2006; Leont'ev 1996; Matveev 1996, 1998, 2001). In a larger perspective, the main water routes in Middle Russia consisted of a multiethnic network during the Late Iron Age. The Volga Bolgar republic was established during the 8th and 9th century A.D., which was followed by the Tatar Golden Ord and Slavic expansion. From a narrower viewpoint the contacts between Mordvinic and Baltic are probably just one example of early Metal Age and Iron Age areal contacts between local Finno-Ugric and Baltic populations.

The corpus investigated below consists of 37 etymologies. It includes both reconciled etymologies that were suggested earlier, and new etymologies. It includes loanwords that have a different value with respect to the evaluation of the chronology of the contacts between Mordvinic and Baltic languages, on the one hand, and western Finno-Ugric and Baltic, on the other hand. More generally speaking, the evidence of Baltic influence on the Finno-Ugric languages is most clearly demonstrated in Finnic, while the Saamic and Mordvinic languages do not have as many Baltic loanwords as found in the Finnic languages.

From an areal perspective, the contacts between Baltic and Finno-Ugric languages have been most intensive in the northeastern Baltic Sea area. The contacts between Southern Finnic (most notably Estonian and Livonian) and Baltic languages (mainly Latvian; Suhonen 1973, 1988; Vaba 1997, 2010) are the most recent stage in a long sequence of contacts beginning in the early Metal Age (Kallio 1998). In the Saamic and Mordvinic speaking areas, direct contacts with Baltic are more limited, as they ended before the beginning of documented history.

These language contacts also reflect the importance of foreign influence on prehistoric Finno-Ugric communities. The Baltic and especially the Germanic influence on the Finnic languages is considered much stronger than the importance of contacts of Baltic and other prehistoric Indo-European varieties with Mordvinic (Posti 1953; Koivulehto 1999b; see also Kallio in this volume). To some extent this is also true of the influence of Germanic and Scandinavian varieties on Saamic (Aikio 2006; Qvigstad 1893). In comparison to these other groups, the early Finnic language community has been much more sensitive to foreign influence. There are probably several reasons for this. The population size, for instance, was likely quite small, especially with respect to the number of speakers of the Indo-European languages. The location in the vicinity of main traffic routes may also have intensified the degree of these contacts.

The assumption of shared Baltic borrowings between Saamic and Mordvinic is incorrect in the light of the investigated data. A small number of Baltic borrowings in Mordvinic were proposed to have cognates in Mari. However, most likely these words were not adopted from a shared proto-language, but instead later gained their present-day geographical distribution (See below, the discussion of the relationship between E *t́ožań*, *t́užäń*, M *t́ožän*, *t́ožäń*, *t́ožəm* ‘1000’ (MdWb 2411–2412) and Mari H *təžem*, M *tüžem*.). In principle, the hypothesis on Baltic lexical influence in Mari is incorrectly motivated, as Mägiste (1959) emphasized already five decades ago. Every suggested Baltic loanword in Mari, altogether less than ten, has a better explanation and phonological rules that clearly show a different origin.

Historically, the etymologies below can be divided into two main groups according to their geographical distribution. A half (19 out of 36) are represented in Mordvinic only and do not have cognates in more western Finno-Ugric languages ((5) E *kardas* ‘yard’; (6) E M *karks* ‘belt’ etc.; (7) E *kerč*, *kerš*, *käŕč*, M *ker*$^{d'}$*ži*, *keŕži*, *käŕži*, *kerš*, *keŕeš* ‘left’; (10) E *kšna*, *šna*, *kišna*, M *šna*, *šə̂na* ‘strap’; (11) E *lango*, M *langa* ‘surface, cover; low’; (17) E *mukoro*, *mukura*, *mukor*, *nukur*, M *mə̂kə̂r*, *mukə̂r* ‘back’ etc.; (18) E *panst*, *panct*, M *pandə̂s*, *pandaz*, *panc* ‘bridle’; (19) E *pejeľ*, *pejiľ*, *päjeľ*, *pijeľ*, M *pejəl*, *pejeľ*, *peľ* etc. ‘knife’; (20) E *penge*, M *pengä* ‘log, firewood’; (22) E *potmo*, *potno*, M *potma*, *potmə̂* ‘inside; inner stomach’ etc.; (23) E *pusmo*, M *pusma*, *busma* ‘bunch, bundle’; (24) E *raśke*, M *raśkä* ‘relative, friend’ etc.; (26) E *ŕeďams*, *ŕäďams*, M *ŕäďams* ‘notice’ etc.; (28) E M *rudas* etc. ‘dirt, mud’; (29) E *simeń*, M *śiməń* ‘tribe, family’; (32) E M *talaj* ‘recently’ etc.; (33) E *turtov*, *turto*, *tortov* ‘to; for’; (34) E *t́eŕďems*, *t́äŕďems*, *t́eŕďims*, *t́eŕgems*, M *t́eŕďəms* ‘call; invite’; (36) E *viŕ*, M *viŕ*, *viŕä* ‘Wald’). In principle, another half (17 out of 36) have etymological cognates in Finnic or in Finnic and Saamic, but about a half of them (8 out of 18) are phonologically ambiguous and cannot descend from a shared proto-language reconstruction with the corresponding word in Finnic ((4) E *inže*, M *inži* ‘guest’; (9) E *kodor,* M *kodə̂r*, *kodə̂rks* ‘(plant’s) stake’; (12) M *luv* ‘space between two fingers’; (14) E *ľepe*, M *ľepe* ‘alder’; (15) E *ľija*, *iľa*, M *ľijä*, *iľe*, *iľä* ‘another, else’; (21) E *puŕgińe*, *puŕgińi*, *piŕgeńe*, *piŕgińe*, *piŕgimä*, M *puŕgəńä*, *pəŕgəńä* ‘thunder’; (27) E *ŕiśme*, M *ŕiśmä* ‘chain; rope; string’; (31) E *šerže*, *šerže*, *šaržə-*, M *šarža*, *šarža* ‘grey hair’ etc.). The discrepancy in sound history suggests that these words are convergent, parallel borrowings. Finally, nine etymologies of the investigated 36 cases (9 out of 36) are historically identical with their Finnic cognates and should be labeled as shared borrowings in terms of sound historical development. However, given that there are other parallel borrowings, the possibility of a convergence cannot be absolutely excluded ((1) E *al*, M *al* ‘egg’; (2) E *čonda*, *čando* ‘price; value’; (3) E *eŕke*, M *äŕʻkä*, *jäŕʻkä* etc. ‘lake, pond’; (8) E *kirda*, M *kə̂rda* ‘turn; habit, manner’ etc.; (13) E *luvod́ems*, *lungịd́ums*, M *lungə̂d́əms*, *luvə̂d́əms* ‘loosen’ etc.; (16) E M **mala* ‘next, surrounding’ etc.; (25) E *raško*, M *raška* ‘inner side of a corner’ etc.; (30) E *šenže*, *šeńš*, *šenš* ‘duck’; (35) E *t́ožań*, *t́užäń*, M *t́ožän*, *t́ožäń*, *t́ožəm* ‘1000’).

Phonologically, the vocalism of the loanwords is important and shows that, actually, there are clearly two different layers in the Baltic loanwords of Mordvinic. Although the development of vocalism cannot be used as the decisive constraint in all etymologies, there are several cases that demonstrate the existence of two different layers. In the older layer ((1) E *al*, M *al* ‘egg’; (2) E *čonda*, *čando* ‘price; value’; (3) E *eŕke*, M *äŕʻkä*, *jäŕʻkä* etc. ‘lake, pond’; (8) E *kirda*, M *kə̂rda* ‘turn; habit, manner; party, feast’; (9) E *kodor,* M *kodə̂r*, *kodə̂rks* ‘stake, plant’s stake’; (10) E *kšna*, *šna*, (Šokša) *kišna*, M *šna*, *šə̂na* ‘strap’; E *lango*, M *langa* ‘surface, cover; low’; (20) E *penge*, M *pengä* ‘log, firewood’; (21) E *puŕgińe*, *puŕgińi*, *piŕgeńe*, *piŕgińe*, *piŕgimä* etc., M *puŕgəńä*, *pəŕgəńä* ‘thunder’; (22) E *potmo*, *potno*, M *potma*, *potmə̂* ‘inside; inner stomach; bosom; bottom’; (34) E *t́eŕd́ems*, *t́äŕd́ems*, *t́eŕd́ims*, *t́eŕgems* etc., M *t́eŕd́əms* ‘call; invite’; (35) E *t́ožań*, *t́užäń*, M *t́ožän*, *t́ožäń*, *t́ožəm* ‘1000’; (36) E *viŕ*, M *viŕ*, *viŕä* ‘forest’), the development of the vocalism is identical with that of inherited Finno-Ugric words but the geographical distribution of the Baltic loanwords is much more limited. Historically, these words were borrowed into Pre-Mordvinic, a prehistoric predecessor of the modern Mordvinic languages that borrowed words from other local Indo-European languages as well, most notably Indo-Iranian and Iranian. The words that represent the more recent layer ((4) E *inže*, M *inži* ‘guest’; (13) E *luvod́ems*, *lungịd́ums* etc., M *lungə̂d́əms*, *luvə̂d́əms* ‘loosen, become uneven, come out (skin)’ etc.; (14) E *ĺepe*, M *ĺepe* ‘alder’; (15) E *ĺija*, *iĺa*, M *ĺijä*, *iĺe*, *ilä* ‘another, else’; (17) E *mukoro*, *mukura*, *mukor*, *nukur* ~ M *mə̂kə̂r*, *mukə̂r* ‘back, bottom, rump; ass’; (23) E *pusmo*, M *pusma*, *busma* ‘bunch, bundle’; (26) E *ŕed́ams*, *ŕäd́ams*, M *ŕäd́ams* ‘notice, perceive, become aware; look for; choose’; (27) E *ŕiśme*, M *ŕiśmä* ‘chain; rope; string, ribbon’; (28) E *rudas*, *urdas*, *rudaz*, M *rudas*, *ə̂rdas*, *ardas*, *urdas*, *urdaz* ‘dirt, mud’; (29) E *simeń*, M *śiməń* ‘tribe, family’; (33) E *turtov*, *tortov*, *turtuv*, *turto(n)* [Postp.] ‘to; for’) were borrowed into Proto-Mordvinic in which all important vowel changes characteristic of both Erzya and Moksha had already taken place (Bartens 1999: 53–67; Erkki Itkonen 1971–72).

The existence of two different phonological layers proves that, despite a relatively small corpus of identified Baltic loanwords in the Mordvinic languages, the language contacts between the Baltic and Mordvinic languages were continuous over an extended period of time. Most likely, these were contacts between geographically adjacent or even neighboring languages. The more recent layer representing Proto-Mordvinic was not adopted much before the time of the first historical documents identifying the Baltic and Finno-Ugric tribes in the Middle

Volga region. The assumption of contacts during the late Iron Age could therefore be compared with archaeological cultures of that era.

It is much more difficult to define the age of the older layer, borrowed into Pre-Mordvinic. As mentioned above, Carpelan and Parpola (2001) assume a long-time continuity in contacts between Finno-Ugric and Indo-European languages in the Middle Volga area. The chronological ambiguity of the Baltic loanwords in Mordvinic supports this assumption, although the analysed empirical data do not allow any further conclusions on their earliest possible age and the geographical area(s). However, these contacts clearly precede the emergence of the contacts with the Slavic and Turkic communities in the area.

Conclusively, the small number of attested etymologies indicates that, after all, the contacts between Baltic and Mordvinic were not intensive. There is no indication, for instance, that the Baltic influence would have affected the grammatical system or typology of Mordvinic. It is only the ubiquitous Russian influence that starts strongly interfering in the Mordvinic languages much later. From the sociohistorical viewpoint the language contacts between early Baltic and Mordvinic varieties show that at the time of Proto-Mordvinic and Pre-Mordvinic the language community was relatively strong and the influence of language contacts were not as intensive as later.

6. Baltic loanwords in Mordvinic

E = Erzya
Fi. = Finnish
M = Moksha
Mari H = Hill Mari
Mari M = Meadow Mari
Md. = Mordvinic
Latv. = Latvian
Lith. = Lithuanian
OPr. = Old Prussian
ORus. = Old Russian
PFU = Proto-Finno-Ugric
PIE = Proto-Indo-European
Pl. = Plural
PM = Proto-Mordvinic
PreMd = Pre-Mordvinic
Russ. = Russian
SaaLu = Lule Saami
Ukr. = Ukrainian

(1) E ***al***, M ***al*** ‘egg’ (MdWb 20–22) (~ Fi. *ola* ‘flint’ (not attested in southern Finnic; SSA 2: 262–263))
< PreMd **(v)ōli*

An identical form with the Baltic origin **(v)ōla* was not possible in Pre-Mordvinic because a first-syllable long vowel could only be combined with a second-syllable non-open vowel. Cf. Md E M *nal* ‘arrow’ (< **nōli*) and E M *san* ‘vein, vessel; tendon’ (< **sōni*).

< (Proto-)Baltic **(v)ōlā*, Lith. *uolà* ‘rock; limestone; whetstone’, *uolis* ‘flint’, Latv. *ōla* ‘a small round stone; flint, rock; egg’. The origin of the Baltic stem is not clear. (Bartens 1999: 55; Fraenkel 2: 1166; Grünthal 2000; Joki 1973: 294; Koivulehto 2000: 118–119, 2001: 47). The loss of **v*- in front of a first syllable *o* is a shared innovation in Finnic and Erzya, but not in Moksha in all

cases (Bartens 1999: 45–46). However, this change occurs very easily as the rise of secondary *v-* in front of a rounded vowel. Both phenomena are frequent in the Finno-Ugric languages. Furthermore, data from the Mordvinic and Baltic languages do not suggest the reconstruction of a word-initial *v-* as Koivulehto suggests on the basis of an assumed earlier history of the word.

(2) E ***čonda***, ***čando*** ‘price; value’ (MdWb 207) (~ Fi. *hinta* id. (attested in all Finnic languages; SSA 1: 165))
< PreMd **šinta* ‘price’
< (Proto-)Baltic **šimta-*; cf. Lith. *šim̃tas* ‘100; much, a lot of’, Latv. *simts* ‘100’ (Uotila 1990: 1 137–139). The Mordvinic word is attested in two Erzya dialects only. The correct reconstruction for E *čando* is **šanta* that cannot be connected with the given Baltic stem. Thus, the variant *čonda* must be considered as the more conservative one. It is phonologically plausible as phonological parallels show E M *oža* ‘sleeve’ (< **šiša*; cf. Fi. *hiha* id.). The historical first-syllable **i* has changed to Md. *o* if the second-syllable vowel was **a*. In Erzya a word-initial *š-* was preserved, as a rule, but it must be assumed that in this word it was treated differently. The cluster *-md-* is possible only in later derivations such as E *čamdoms*, M *šamdə ms* ‘make empty’ (< E *čamoms*, M *šamə ms* ‘become empty’(MdWb 206)).

(3) E ***eŕke***, M ***äŕʿkä***, ***jäŕʿkä*** etc. ‘lake, pond’ (MdWb 379) (~ Fi. *järvi* (attested in all Finnic languages) ~ SaaN *jávri* ~ Ma. W *jär*, E *jer* id. (UEW 633; SSA 1 259))
< Proto-Mordvinic **järkä*
< PreMd**jär(v)i*
? < Baltic. **jaurā* / **jūrā*; cf. Lith. *jáura* (Pl. *jáuros*) ‘marsh, peatsoil’, *jaurùs* ‘swampy, marshy’; cf. Lith. *jū́ra* ~ Latv. *jūŗa* ‘sea, lake’ (Nuutinen 1989). The comparison was made already in the 1920s (Liukkonen 1999: 9). Basically, the Pre-Mordvinic front vowel **ä* cannot originate from a back vowel. Thus, the etymology is possible only if Baltic **ja-* was be substituted with Pre-Mordvinic **jä-* as Nuutinen assumes for Finnic. The question is why was the first syllable not substituted with **jav-* that should have resulted in Md. **jov-/_i*. The loss of **-v-* happened in E *śuro*, *śura*, M *śura* ‘horn’ (cf. Fi. *sarvi* id.) as well. Viitso (2008: 242) notes that the Livonian (in Courland) variant *jōra* ‘lake’ (: *jarrõ* in the nominative and illative singular) does not implicate the earlier existence of a front vowel stem but it could be derived from *jar-* with a stem vowel *-a-* as well deriving from **jarva*. However, the Salaca Livonian form *järu* (Winkler & Pajusalu 2009: 73) seems to be more conservative. In Courland Livonian the loss of the consonant cluster *-rv-* has lead to the change of the stem vowel to *-a-* and a metaphonic change in the first-syllable vowel. Likewise, the difference is seen in Courland Livonian *tȭra* ‘tar’, Salaca Livonian *türv* id. (< **terva*) (Winkler & Pajusalu 2009: 206), in which the latter one has preserved the quality of the historical first-syllable front vowel **e* whereas in Courland Livonian there is no

trace left of the earlier front vowel. However, in this case the western dialects of Courland Livonian have preserved a front vowel as well, as demonstrated in *tīra*, *tǖra* id. (LWb 416).

In North Russian toponymy there are several affixes resembling the presented appellative, such as *jar-*, *jagr-*, *jahr* and *javr(o)-* resembling either the Finnic or the Saamic and Baltic words mentioned (Matveev 2004: 314, 329). Saarikivi (2004: 215–216) notes that the relationship between this name pattern and the words attested in various Finno-Ugric languages is not fully clear.

(4) E ***inže***, M ***inži*** 'guest' (MdWb 460–461) (? ~ Fi. *ihminen* 'man' etc. (attested in all Finnic languages; SSA 1 221, UEW 627))
< PreMd **inši(mi)*
< (Proto-)Baltic **inžinmī*; cf. Lith. *įžymì* '(well-)known') (Liukkonen (1999: 61–62). Koivulehto (1991: 79) suggests an earlier Proto-Indo-European etymology for Finnic and Mordvinic (< Proto-Indo-European **ǵn̥h*$_1$-). Koponen points out that in fact, the Finnic word has numerous variants and that it is difficult to connect all the variants with one single proto-language stem. According to him (Koponen 2000: 103), the various Finnic words derive from two historically distinct word types, namely (1) **imeh-(n)inen/no* or (2) *inVhm-(V)inen/-oi*.

As regards the Mordvinic word, *e-* would be the expected descendant of Pre-Mordvinic or Proto-Finno-Ugric first-syllable *i-* with a front vowel in the second syllable, as in *kev* 'stone' (< **kivi*). Thus, assuming that, in principle, the loanword etymology is correct, the Mordvinic and Finnic words must be of different origin although they look like etymological cognates. This supports the assumption of a Baltic origin and suggests that actually the Baltic borrowings in Mordvinic must represent two different layers and the given word represents the later one. Alternatively, Pre-Mordvinic **īnši* would be a possible reconstruction of the Mordvinic words, but there is no evidence on the Baltic side why this should be assumed. (Cf. also E *kšna*, *šna*, M *šna*, *šə̂ na* below.)

(5) E ***kardas*** 'yard' (MdWb 617–618)
< ProtoMd **kardas*
< PreMd **kartas*
< (Proto-)Baltic **gardas*; cf. Lith. *gar̃das* 'pen, paddock, fold (for cattle)'; cf. Old Church Slavonic *grad˙* 'castle, town, yard', Russ. *gorod* 'town' etc. (Thomsen 1890: 170–171; Joki 1973: 269–270; SSA 318). The reconstruction **kartas* with a voiceless stop **-t-* is more likely in Pre-Mordvinic than **kardas* because presumably the early Pre-Mordvinic variants did not have voiced plosives. Nevertheless, the rise of the opposition between voiceless and voiced plosives (*p : b*, *t : d*, *k : g*) and the loss of the quantitative opposition between geminate and single plosives (*pp : p*, *tt : t*, *kk : k*) is one of the most characteristic changes in the phonological system of Pre-Mordvinic. Thus, the chronology of language contacts and adoption of loanwords are of special importance for the reconstruction of phonological changes in Mordvinic.

A parallel Baltic etymology has been suggested for E *kardo*, *karda*, M *karda* ‘cowshed, horse stable’ (MdWb 619–620) (? < PreMd **karta*) based on the (Proto-)Baltic reconstruction **gardā*; cf. Latv. dial. *gãrds*, *gārda* ‘enclosure for beef cattle (especially for pigs)’ (Wälchli 1997: 307). The assumption originates from Thomsen (1890: 170–171), who erroneously connected this word with the same Baltic origin as Erzya *kardas*. The lexical variation attested in Latvian dialects is caused by a different origin: *gãrds* (< **gardas*), *gārda* (**gardā*) ‘enclosure for beef cattle (especially for pigs)’ (Petri Kallio, personal communication).

There is an alternative etymology suggesting that the Mordvinic word is borrowed from Chuvash *karᴅa* ‘(cattle) enclosure (on the field)’ (MdWb 619; Räsänen 1946: 196) that has cognates in other Turkic languages and has been borrowed into several other Finno-Ugric languages (Ègorov 1964: 91). In Chuvash the plosive *t* is voiced as a lenis in an intervocalic and post sonoric position, which explains the voiced plosive *-d-* in Mordvinic. Those dialects in which the Erzya *kardo* (also *alašań kardu* ‘horse stable’; E:Mar Atr Večk Hl; for abbreviations, see MdWb LXXXVII–XCIX and LVIII) is attested are spoken in the vicinity of the Chuvash language area. Given the later age of contacts with Chuvash and the more exact semantic correspondence, the assumed Chuvash loan etymology is more likely. However, it must be noted that the Mordvinic word is attested in more western dialects as well, with a greater distance to the geographical area of Chuvash.

(6) E M ***karks*** ‘belt; the straw with which the sheaf is bound; the hip thread of women’ (MdWb 622–625)
< PreMd **kar-ksi*
< (Proto-)Baltic **kar-*; cf. Lith. *kariù*, *kárti* ‘hang with a strong string’, Latv. *kaŗu, kãrt* ‘hang’; Lith. *pakara* ‘coat rack’, Latv. *pakars* ‘(suspension) hook’, OPr. *paccaris* ‘strap’ < PIE **kō̆r-* ‘hang’ (**ker-*) (Karulis 1992 I: 386; Pokorny 1959: 573). The earlier comparison of E M *karks* with Finnish *kaari* ‘bow’ etc. is not correct (SSA 1: 265; UEW 1988: 216).

The Mordvinic word is a derivative, as are the vast majority of Mordvinic words ending in *-ks*. In the Reverse Dictionary of Mordvinic there are more than 2.500 words that end in *-ks* (Luutonen & al. 2004: 298–321).] However, very few of them, considerably less than ten percent, are not transparent denominal or deverbal derivatives. Three of them belong to the old inherited Finno-Ugric stock namely E *pešks*, M *päšks* ‘hazel(nut)’ ~ Finnish *pähkinä* id. etc. (SSA 2 455; UEW 726), E M *soks* ‘ski’ ~ Finnish *suksi* id. etc. (SSA 3 210; UEW 450) and E M *vaks* ‘span etc.’. In the two last ones, *-ks* is a descendant of the word-internal consonant cluster *-ks-* whereas in E *pešks*, M *päšks*, *-ks* is a derivative suffix. In the word E M *śokś* ‘autumn’ (~ Finnish *syksy* id. etc.) the sibilant is palatal and, thus, the word-final *-kś* is not identical with the derivative suffix *-ks*. Etymologically, several words ending in *-ks* are actually derivations, although in present-day language they may lack the underived stem. Thus, there are several lexicalised derivations, such as E M *ponks(t)*, *poŋs* (MdWb 1747–1748), which is etymologically a derivation of E M *ponams* ‘twist, twine’, but one which cannot be considered as productive any more. In addition to E M *karks* ‘belt etc.’, E *pešks*, M *päšks* ‘hazel(nut)’, and E M *soks* ‘ski’ the following Mordvinic one-syllable nouns end in *-ks* and are not transparent and etymologically unambiguous derivations: E *onks*, *onkst* ~ M *unks*, *uns* ‘measure; length; weight; pood’, E M *piks* ‘rope’, E *seks*, *sekśe* ~ M *sexks*, *seksa* ~ *seksə̂* ‘dirt’, E M *suks* ‘worm, maggot’, E *śenks*, (Atr) *śeŋś* ~ M *śänks*, *śänkś* ‘stork’, E M *vańks* ‘clean’. Furthermore, there is at least one two-syllable word ending in *-ks*, namely E *alkuks* ~ M *afkə̂lks* ‘really, indeed; true’ that is not a derivation of any other Mordvin word.

This suggested etymology assumes that the borrowing was not preserved as a verb but a noun derivative. There is no word stem without the noun derivative suffix *-ks*, although most derived nouns with the suffix *-ks* are productive forms cf. *jovks* ‘fairy tale’ ← *jovtams* ‘tell’. However, there are other loanwords, such as E *salmuks*, *salmoks*, M *salmə̂ks* ‘needle’ that do not have an underived cognate of the borrowed stem either (< Slavic **solmā*). Finally, it must be noted that PreMd **kari-* would correspond to E *kor’-*. So, it must be assumed that this borrowing belongs to the later layer of Baltic loanwords in Mordvinic.

(7) E ***kerč***, ***kerš***, ***käŕč***, M ***ker***$^{\acute{d}}$***ẓ̌i***, ***keŕẓ̌i***, ***kärẓ̌i***, ***kerš***, ***keŕeš*** etc. ‘left’ (MdWb 714–715)
< PreMd **keršì*
< (Proto-)Baltic **kreišas*; cf. Latv. *kreiss* ‘left’, Lith. *kaĩras, kaĩrùs, kaĩrias, kairỹs* ‘left’ ~ Latv. *ķeĩris, kreĩlis*. Toporov and Trubachev (1962: 247–248) suggested incorrectly that the Mordvinic word was borrowed from a parallel Baltic stem **kurša-* (> Lith. *kuršas* ‘Latvian, inhabitant of Curonia’) that is not possible for phonological and semantic reasons. In the given etymology the word-initial consonant cluster was not possible in Pre-Mordvinic.

Word-initial consonant clusters of Indo-European loanwords were frequently replaced with single consonants in Finno-Ugric languages. The other substitution type is represented in words in which a metathesis split the consonant cluster. This has happened in quite recent borrowings and Russian loans in Mordvinic, such as M *šerba*, *žerba* ‘lot’ < Rus. *žrebij* id. (MdWb 2227–8). Another example is Finnish *kyrsä* (archaic) ‘bread’, Veps *kürz* ‘pancake’ that is traditionally considered as a cognate of Mordvinic *kši* ‘bread’ (SSA 1: 466; UEW 679). Koivulehto (1999a: 212) suggests that the word **kürsä* is an Indo-European loanword that originates from IE/Balto-Slavic **krusā́* and labels it as a possible Pre-Slavic loanword, because the word is preserved in the Slavic languages only (**krusā́* > **krušā́* > > Early Proto-Slavic **krušā́* > Late Proto-Slavic **krŭchá* > Russian *krohá* ‘(bread)crumb’. However, the derivation of Mordvinic *kši* from **kürsä* is not without problems, because **s* should be represented as *-s-* instead of *-š-*. Consequently, it seems possible that the Finnic and Mordvinic words are distinct loans from an early (Balto-)Slavic variety.

(8) E ***kirda***, M ***kə̂rda*** ‘turn; habit, manner; party, feast’ etc. (MdWb 763–764) (~ Fi. *kerta* etc. (attested in all Finnic languages; SSA 1 347–348; UEW 659))

< ProtoMd **kirda*

< PreMd **kerta*

< (Proto-)Baltic **kerdā* f.: OPr *kērdan* (SG.ACC)*, kerdan* ‘time’, Lith. **kerda* ‘turn, order’ ~ Latv. *kārta* ‘layer; turn’. This etymology shows that, as in the Finnic languages, *e-a* stems were adopted into Mordvinic in connection with Baltic loanwords and first-syllable *e* was not sensitive to palatal harmony rules. The original second-syllable **a* was preserved in Proto-Mordvinic, and hence was treated differently than second-syllable **ä* of inherited Finno-Ugric words. In words such as E *kize* ‘summer’ (~ Fi. *kesä*) and E *pize* ‘nest’ (~ Fi. *pesä*) the change **ä* > *e* took place in the second syllable. Thus, PreMd **kertä* following the palatal harmony between front vowels should have led to Erzya **kirde*. Nevertheless, this is not the case and, consequently, a PreMd *e-a* combination can be assumed.

Recently, Parpola (2010: 311) has suggested that the Finno-Ugric word could be a much older loan originating from Proto-Aryan **krt* ‘time, turn’. This, however, would mean that the *e-a* stems in the Finnic languages, and Mordvinic, are much older than is usually assumed. It is assumed that this stem type *e-a* was adopted in the Finnic languages parallel with the early Baltic loanwords. The assumption that the bimorphic adverbs Hill Mari *pülägerdä* ‘long ago’ and Meadow Mari *šukerte* etc. ‘long ago’ (TschWb 573, 729) would include the same Baltic word is incorrect. As demonstrated by Mägiste (1959: 172–174) the Mari word has a more plausible explanation based on the grammaticalisation and suffixation of a verbal phrase consisting of an adverb and the verb Hill Mari *ertäš*, Meadow Mari *ertaš*.

(9) E ***kodor****,* M ***kodə̂r***, ***kodə̂rks*** ‘stake, plant’s stake’ (? ~ Fi. *ketara* ‘stake of sledge (sleigh)’ etc. (attested in most Finnic languages including southern varieties; SSA 1 351))

? < PreMd **kitara*

? < (Proto-)Baltic, cf. Lith. *keterà, kẽtaras, sketerà* ‘withers of a horse; ridge’, *sketers* ‘roof ridge; a stick at thatched roof’. The etymology is phonologically and semantically defective but, nevertheless, not completely impossible. Phonologically, a labial vowel and a reconstruction such as **kotira*, **kutara or* **kutira* is historically more likely but none of these can be derived from the Baltic stem. Furthermore, PreMd **e* would more likely correspond to Baltic **e* as E *kirda*, M *kə̂rda* above. In *i-a* stems PreMd **i* > changed to Proto-Mordvinic **o* as in **sita-* > E *sodo-*, M *sodə̂* ‘bind’ (Bartens 1999: 56; Erkki Itkonen 1946: 301), which would explain the development from the suggested Pre-Mordvinic to Mordvinic. However, this hypothesis still does not explain why the Baltic first-syllable **e* should have been replaced with **i* in Pre-Mordvinic.

(10) E ***kšna***, ***šna***, (Šokša) ***kišna***, M ***šna***, ***šə̂na*** ‘strap’ (MdWb 909) (~ Fi. *hihna* id. (attested in all Finnic languages) ~ ?? Ma. H *šəštə*, M *šüštö* ‘strap; tanner leather’ (SSA 1: 161; UEW 786))

< PreMd **šikšna*

< (Proto-)Baltic **šikšnā*; cf. Lith. *šikšnà* ‘leather; strap’, Latv. *siksna* ‘strap’ (Thomsen 1890: 223). As in the case of E *inže*, M *inži* ‘guest’ (cf. above) the way (Proto-)Baltic **i* is manifested in Mordvinic is different from the old inherited Finno-Ugric words and one would expect that in *i-a* stems the first-syllable **i* changed to *o* (Bartens 1999: 56). Thus, if the borrowing belonged to the same chronological layer with the inherited vocabulary, the expected present-day form in Mordvinic would be **šokšna*. Consequently, the phonological evidence suggests that the given word was borrowed separately into Finnic and Mordvinic instead of into a shared proto-language. The adoption of Baltic loanwords in Mordvinic is a chronological terminus ante quem that distinguishes them from those sound changes that influenced earlier vocabulary.

The comparison of the quoted Mari word with the Finnic and Mordvinic words is ambiguous, because the labial vowel *ü* cannot descend from **i* in an illabial context. Furthermore, in Mari the consonant cluster *št* descends from an identical proto-language cluster *št* as in *jüštö* ‘cold’ (~ Finnish *jä(ä)htyä*, Estonian *jähtuma* ‘cool’ (verb)) and *tošto* ‘old’ (~ Md E *tašto*, E M *tašta*, M *taštə̂* id.). More generally speaking, there are very few Mari words that are supposed to be Baltic borrowings. None of these etymologies is plausible (Mägiste 1959). Thus, the adoption of these words did not happen during a shared proto-language, instead the given words were borrowed from a different source or have a different etymology and later gained their present-day geographical distribution. (See below, the discussion of the relationship between E *t́ožań*, *t́užäń*, M *t́ožän*, *t́ožäń*, *t́ožəm* ‘1000’ (MdWb 2411–2412) and Mari H *təžem*, M *tüžem*.)

(11) E ***lango***, M ***langa*** ‘surface, cover; low’ (MdWb 1009–1021)

< PreMd **lanka*

< (Proto-)Baltic **lankā*, cf. Lith. *lankà* ‘field, lowland; marsh; valley; low, flat surface’ ~ Latv. *lañka* ‘low, flat surface’; big low field’ etc. (Wälchli 1997: 316–317).

Phonologically, the etymology is fully plausible. Functionally, the Mordvinic word is grammatically more specialised because it is mainly used as a postposition that is inflected in local cases (E *lango* : *langs* ‘(up)on [ILL]’: *langso* ‘(up)on [INE]’ : *langsto* ‘(up)on [ELA]’ : *langov* ‘(up)on [LAT]’ : *langa* ‘(up)on [PROL]’; MdWb 1009–1019). However, it can be assumed that the original meaning of the Pre-Mordvinic word **lanka* was ‘surface’. There are compound nouns that support this hypothesis and show how the word defines the indicated object: E *čalgamo-lango*, M *žalgaa-langa* ‘step’, E *kalmo-lango*, M *kalma-langa* ‘cemetery’, E *kaš-lango* ‘place above the stove’ etc.

(12) M ***luv*** ‘space between two fingers’ (MdWb 1085–1087) (~ Fi. *loma* ‘gap; break; holiday etc.’ (attested in Karelian but not in other Finnic languages) ~ SaaN *loapmi, loapmu* ‘space (between something), open space, chink; valley’ ~ ? Mari (Hill) *lo* ‘space (between something)’, *lǒštə̑* ‘inside’)
? < PreMd **loma*
? < (Proto-)Baltic **lōmā* (~ **lāmā*), cf. Lith. *lomà*, *lõmas* ‘hole, hollow’ ~ Latv. *lãma* id. etc.; the Baltic words are etymologically cognate with Lith. *lúoma* ‘orbit (of eye)’ ~ Latv. *luõma* ‘layer, turn, time’ ((Fraenkel 1962–65: 385; Sammallahti 1977: 124; SSA 2: 90). Phonologically and semantically the etymology is possible. There are other Mordvinic words such as E M *lov* ‘snow’ (~ Fi. *lumi* id.), E *čovar*, M *šovar* ‘mortar’ (~ Fi. *huhmar*) and E *suv* ‘fog’ (~ Fi. *sumu*) in which the change **-m-* > *-v-* took place after a labial vowel.

However, the plausibility of the etymology is not as clear in the light of the geographical distribution of the Mordvinic word. It is attested in one local Moksha dialect solely in the oblast of Penza. In Heikki Paasonen’s Mordwinisches Wörterbuch the authors refer to the derivational relationship between *luv*^{1} : *luvoďems* ‘loosen, scale (off), peel off’. The word E M *luv*^{1} ‘number, order’ etc. has many variants. It is widely attested in both Erzya and Moksha dialects and has several meanings, presumably semantic derivations of the original one that etymologically corresponds to Finnish *luku* ‘number, order, chapter’ and *lukea* ‘read’ with cognates in many other Finno-Ugric languages (SSA 2 100–102; UEW 253). Here the point is that according to Mordwinisches Wörterbuch, in the Moksha dialects of Penza the word *luv*^{1} has the meaning ‘the place in the warp or hair in which the yarn is attached’ (MdWb 1081). It is obvious that that the examined Moksha word *luv* ‘space between two fingers’ that is presented as *luv*^{2} in MdWb is connected with *luv*^{1} and its semantic properties. This makes the suggested Baltic origin unlikely.

The Mari word mentioned above and quoted in etymological dictionaries is phonologically more problematic because in monosyllabic words the word-final *-m* was typically maintained in modern varieties after apocope in historically disyllabic words, such as Mari *lum* ‘snow’ (~ Finnish *lumi* id.). The word *lo* ‘space (between something)’ is attested as a noun in Hill Mari (western Mari) but as a postposition it occurs in the whole Mari language area in Meadow Mari, the northeastern and eastern dialects as well with a first-syllable *u* as in *lu-* : *lugə̑č* ‘between, in the middle of, suddenly’ (SMJa 3: 408; TschWb 349). The inflection of the postposition *lu* is presented already by Szilasi (1901: 116) as follows: *lu-* : *lušto* ‘between, beside [LOC]’ : *lueš* ‘between, beside [LAT]’ : *lugə̑č* ‘between, beside [ABL]’. The listed Finnish, Mordvinic, and Mari words are presented as etymological cognates in UEW (692). However, this comparison has some problems. Considering the Finnish word as a Baltic loanword decreases the plausibility of its common origin with the suggested Moksha, Mordvin, and Mari word, which shows that the grammaticalisation process should be analysed in more detail to reconsider the given etymology.

(13) E ***luvoďems***, ***lungịďums*** etc., M ***lungə̂ďəms***, ***luvə̂ďəms*** ‘loosen, become uneven; peel’ etc. (MdWb 1085–1086) (~ Fi. *lunka* ‘loosening bark’ (not attested in other Finnic languages) ~ SaaN *loggut* jne. ‘tear bark; strip the turf’ (SSA 2 103; UEW does not present this comparison))
? < PreMd **lunka-*
< (Proto-)Baltic **lunka-*, cf. Lith. *lùnkas* ‘bast’, OPr. *lunkan*, Latv. *lūks* id. (SSA 2 103)

The proposed loanword etymology was originally suggested for Md E *ľenge*, M *ľengä* ‘bast’ (MdWb 1110–1112; Paasonen 1953 [1909]: 89), which, however, is not phonologically possible. The modified version presented in SSA has some crucial points that must be discussed in more detail. Firstly, the Mordvinic word is a verb derivation that does not have a transparent underived stem. In Heikki Paasonens Mordwinisches Wörterbuch (MdWb 1085–1086) the Mordvinic verb is presented as a subentry of *luv* (see above). However, the verbs with *-ng-* cannot be derived from it as the consonant cluster **nk* was preserved as *ng* in Mordvinic (Bartens 1999: 49). Secondly, the etymological cognate in Finnish is a noun and it is not attested in other Finnic languages. The Saamic cognate word is a verb, but the Baltic stem is a noun. Thirdly, in inherited Finno-Ugric words first-syllable **u* is regularly represented as *o* in present-day Mordvinic, as in E M *moda* ‘soil’ (< **muta*), E M *tol* ‘fire’ (< **tuli*) (Bartens 1999: 55; Bereczki 1988: 320; Erkki Itkonen 1946: 300–302). Conceivably, one would expect a Pre-Mordvinic **lonka-* as Koponen (1988: 93) implicitly assumes or **lūnki-* that, nevertheless, cannot be the historical proto-forms of the Finnic and Saamic words (cf. UEW 256 also finds this comparison suspect). Koponen considers it possible that the Finnish word was borrowed from Saamic.

The Baltic etymology is possible, if one assumes that the loanword was borrowed distinctly into Saamic (Finnic) and Mordvinic. Otherwise one must assume that there was a relatively late common proto-language period between the Finnic (Saamic) and Mordvinic languages during which the contacts took place. Furthermore, one has to assume that a (Proto-)Baltic noun stem was borrowed as a verb derivation into Mordvinic. Hallap (2000: 101–126) bridges several allophonic derivation suffixes that are productive and partly allophonic in the Mordvinic languages. The list includes both transitive and intransitive deverbal and denominal derivations, of which some lend plausible support to the assumption that the given Mordvinic word could be historically a denominal borrowing: E *pejďems*, M *pejəďəms* ‘laugh’ ← E M *pej* ‘tooth’, E *ľemďems*, M *ľemďəms* ‘call, name’ ← E M *ľem* ‘name’. Furthermore, similar derivations have been made of onomatopoetic words or interjections such as E *uhaďems* ‘groan’ ← *uh* ‘ugh’ and E *skokaďems* ‘jump’ ← Russian *skok!* ‘whoops’ which shows that the derivation type was used to adopt borrowings in Mordvinic as verbs. The parallel suffix **-da* was used to adopt the word E *tolkundams* ‘billow, sway, wave’ ← Turkic *tolkun* ‘wave’. Nevertheless, the etymology would be more plausible, if there were a noun stem corresponding to the Baltic origin in Mordvinic as well.

As regards Md E *ĺenge*, M *ĺengä* ‘bast’, the point Mägiste (1962) makes is completely valid. There is no reason to consider this word as a Baltic loanword but the Mordvinic cognate of Finnish *niini* ‘bast’ (attested in all Finnic languages), Mari *ni* ‘bast (of young linden)’, Udmurt *ńiń*, Komi *ńiń* id. Both SSA (SSA 2: 218) and UEW (707) refute this comparison without explaining why this should be done. The only phonological problem is with the change PFU **ī* > Mordvinic *e* but as Mägiste notes, this is an exception that proves the rule. As in the case of Finnish *nimi* ‘name’ ~ MdE *ĺem* with cognates in all Uralic languages (SSA 2: 222; UEW 305), the Mordvinic *ĺ* corresponds to a dental nasal *n* ~ *ń*. The sound change is most likely a result of a phonological dissimilation, possibly conditioned by a one-syllable stem in the two Mordvinic examples.

(14) E ***ĺepe***, M ***ĺepe*** ‘alder’ (MdWb 1112) (~ Fi. *leppä* id. (attested in the whole Finnic language area; SSA 2 64–65; UEW 689))
< PreMd **leppi* ~ **leppä*
< (Proto-)Baltic **leipā*, cf. Latv. *liepa*, Lith. *lìepa*, OPr. *leipa* ‘lime, linden’ (Sammallahti 1977: 123–124). The Saamic word SaaN *leaibi* ‘alder; blood’ is a distinct loan from Baltic. Likewise, it must be assumed that so is the Mordvinic. In inherited Finno-Ugric vocabulary the vocalism in reconstructions such as **leppä* should be met with Mordvinic **ĺipe*. Furthermore, as Kallio (2008: 273–274) shows, (Proto-)Balto-Slavic diphthongs usually appear as diphthongs in the Finnic and Saamic languages. The intervocalic plosive *-p-* in Mordvinic either descends from a geminate *-pp-* as in E *sepe*, M *säpä* ‘bile’ < **säppä* (Bartens 1999: 40) or the loan is more recent than the restructuring of the plosive system. In Proto-Mordvinic, the quantitive correlation between short and long geminates was replaced with a qualitative opposition between voiceless and voiced plosives (Bartens 1999: 36–41, Keresztes 1987: 58–68). The phonological details need the evidence of parallel etymologies with a similar phonological structure.

(15) E ***ĺija***, ***iĺa***, M ***ĺijä***, ***iĺe***, ***ilä*** ‘another, else’ (MdWb 1125–1127)
< Proto-Md **lijä*
< ? PreMd < **lika* (~ **līka*)
< (Proto-)Baltic; cf. Lith. *liẽkas* ‘odd, extra, too much’, *lỹkis* ‘surplus’, Latv. *lieks* ‘too much, extra, unnecessary’ (SSA 2: 73; Thomsen 1890: 195–196)

Despite the similarity between the Mordvinic word and Finnish *liika* ‘too much; odd etc.’ with cognates in all other Finnic languages, the etymological dictionaries have not considered the Finnic and Mordvinic words as etymological cognates (SSA 2: 73; UEW; likewise Erkki Itkonen 1946: 302–303). However, as several other etymologies in this list demonstrate, many Baltic loanwords of the Mordvinic languages have not participated in those sound changes that affected inherited Finno-Ugric words. It seems that those few cases that have a parallel word in the Finnic languages, must have been borrowed separately in two distinct areas or there used to be a connection between Finnic and Mordvinic speaking areas after the unity broke up. Assuming a shared origin of the

Mordvinic and Finnic words, the correct reconstruction in Pre-Mordvinic would be **līki* sharing the characteristics of inherited Finno-Ugric vocabulary such as Md. E *vijems*, M *vijəms* ‘take, bring, return’ (< **vīke-*). However, in this case the expected form in Erzya would be **l′ije*. Thus, if the Mordvinic word is a Baltic borrowing, it must be a convergent borrowing.

From a phonological point of view there is a discrepancy between the Erzya and Moksha forms. Erzya refers to a second-syllable back vowel **a*, whereas Moksha implicates **ä*. Basically, the weakening of the intervocalic plosive **-k-* > *-j-* took place only between palatal vowels, which means that the Moksha variant *l′ijä* is a more conservative one. The methatetic variants E *il′a*, M *il′e*, *ilä* are secondary in both Mordvinic languages and have a more limited areal distribution. Bartens (1999: 63) notes that there are not many examples of second-syllable **ä* in Proto-Mordvinic and assumes that in M *pir’ä*, *pr’ä* ‘head’ (~ E *pr’ä*, *pir’ä* id.; Finnish *perä* ‘adit, back’ etc. (SSA 2: 342–343; UEW 373)) the second-syllable change *a* > *ä* is secondary. Nevertheless, there is no unambiguous reason why a Proto-Mordvinic second-syllable **ä* should not be assumed in the case of M *pir’ä*, *pr’ä* ‘head’. Likewise, E *l′ija*, M *l′ijä* can be derived from Proto-Mordvinic **likä* with a second-syllable *ä*. The question then remains whether a Pre-Mordvinic variant should be reconstructed at all.

(16) E M ****mala*** ‘close environment; next, surrounding’: E *malaso*, M *malasa* ‘near [INE]’ etc., E *malasto*, *malasta*, M *malasta* ‘near (from) [ELA]’, E M *malas*, *malav* ‘near (to) [ILL]’ (MdWb 1166–1168) (~ Fi. *malo* ‘edge, side; chink, hole’ (attested in Karelian but not in other Finnic languages) ~ ? SaaLu *muolōs* ‘unfrozen hole in the ice (in the spring)’ SSA 2: 144)
< PreMd **mala*

< (Proto-)Baltic **malā*; cf. Lith. *malá* ‘land, landscape; edge’ ~ Latv. *mala* ‘edge; cost, surrounding’ (Nuutinen 1987, SSA 2: 144; Wälchli 1997: 314))

Nuutinen (1987: 524) mentions two possible etymological explanations for **mala* and argues that it may originate from a common proto-language between Finnic and Mordvinic, or it may have been transferred to the Mordvinic languages via Finnic. Wälchli (1997: 314) leaves it open whether the word is a shared or separate borrowing in Finnic and Mordvinic, but points out that it is possible to show the Baltic origin of the Mordvinic word only by means of the Finnic word, as it is fully grammaticalised in Mordvinic. As regards Finnic, the word is attested only in Finnish and Karelian. The Finnish etymological dictionary (SSA 2: 144) claims that the word *mala* ‘sea beach (with sand)’ also occurs in Estonian. However, this word is not mentioned in Estonian dictionaries (EKSS, VMS, Wiedemann 1973).

(17) E ***mukoro***, ***mukura***, ***mukor***, ***nukur*** ~ M ***mə̂kə̂r***, ***mukə̂r*** ‘back, bottom, rump; ass’ (MdWb 1294–1296)
< PreMd **mukkara*

? < (Proto-)Baltic **mugurā-*, cf. Latv. *mugura*. The etymology is suggested by Thomsen (1890: 204) and Vaba (1985) considers it plausible, whereas

Fraenkel ((Fraenkel 1962–65: 510) is more sceptical. The history of the Latvian word is disputed and Karulis (1992 1: 604), for instance, considers **magur-* and **magul-* as possible reconstructions. As Fraenkel notes, the relationship between the given Latvian word and Lithuanian *nùgara* ‘back’ is also unclear ((Fraenkel 1962–65: 510). There are similar words in other FU languages such as Mari H *mongər*, M *mugor* ‘body; side, direction’, Udm. *mygor*, *mugor* ‘body, growth, shape etc.’ (~ Ko.), Hungarian *mag* ‘seed; corn; kernel etc. that according to UEW (286) originate from the stem **munkV* ‘body’, whereas Sammallahti (1988) does not include these words in his list. In Mari, the denasalised variant M *mugor* nbody; side, direction’ is presumably a Permic loanword (Bereczki 1992: 102). None of the sources connects the mentioned words with the Mordvinic one. In fact, Thomsen (1890: 204) was aware of possible cognates in other Finno-Ugric languages and concluded that the Mordvinic word most likely must be connected with those of Mari and Permic.

Phonologically and semantically it is possible to bridge the Mordvinic word with the Baltic stem. The Finnic languages have replaced a single voiceless or voiced plosive with a geminate voiceless one in loanwords adopted from different Indo-European languages, such as Fi. *kappale* ‘piece etc.’ < (Proto-)Baltic **gabalas*, cf. Lith. *gãbalas* ‘piece of land’, Latv. *gabals* ‘piece, part; region; period’ (SSA 1: 307), Fi. *kukkaro* ‘purse etc.’ < Proto-Germanic **kukaro* (SSA 1: 428) and Fi. *tappara* ‘battleaxe, hatchet’ < Russian *topor* ‘axe’ (SSA 3: 270). Given that the phonological system of early Proto-Finnic and Pre-Mordvinic has been quite similar, it is correct to assume that a similar substitution of *-k-/-g-* with *-kk-* in a tri-syllabic word was possible in Pre-Mordvinic, too.

The vowels in Mordvinic represent a clearly later stage than those of inherited Finno-Ugric words, as is the case of *kirda*, *l̕epe*.

(18) E ***panst***, ***panct***, M ***pandə̂s***, ***pandaz***, ***panc*** ‘bridle’ (MdWb 1534)
< PreMd **pantas*
< (Proto-)Baltic **pantias*, cf. Lith. *pantis* ‘tether; fetter’, *pánčia*, PL *pánčios* ‘shackles, fetters’ ~ OPr. *panto* ‘tether’ ((Fraenkel 1962–65: 537; Joki 1973: 57, 60)

Erzya dialects have two parallel plurale tantum forms that include the indefinite plural marker *-t* (E *panst* ~ *panct* < *panc-t* < **pand-Ø-s-t* ~ **pandə̂s-t*). The Moksha variants do not display a plural suffix, and hence are structurally more conservative and have preserved the Pre-Mordvinic stem without dropping the second-syllable vowel. In Erzya, the given word follows the same productive morphophonological alternation rule as two-syllable nouns ending in *-e* or *-o*, such as E *pango* ‘mushroom’ : *pang-t* mushroom-PL ‘mushrooms’. Pre-Mordvinic **pantis* is unlikely, because in this case one would expect a palatalized sibilant **ś* or affricate **ć*, and possibly the shift of the first-syllable vowel from *a* to *o*.

(19) E ***pejel′***, ***pejil′***, ***päjel′***, ***pijel′***, M ***pejəl***, ***pejel′***, ***pel′*** etc. ‘knife, blade of a knife, chopping knife’ (MdWb 1588)
< PreMd _*pejili_
< (Proto-)Baltic _*peilias_; cf. Lith. _peĩ̱lis_ ~ Latv. _peĩ̱lis_ ~ OPr. _peile_ ‘knife’ (Fraenkel 1962–65: 563; Joki 1973: 57 [Tomaschek]; Thomsen 1890: 207).

This etymology is one of the oldest comparisons and least ambiguous Baltic loanwords in Mordvinic. Vaba (1988: 181–183) points out that there is a similar word in South Estonian that, nevertheless, cannot be directly connected with the Mordvinic one. Given that, as a rule, Pre-Mordvinic first-syllable _*e_ was preserved in Proto-Mordvinic, Erzya, and Moksha, it is not possible to discuss the chronology of this word in the evidence of vocalism in order to compare it with those etymologies that seem to represent a more recent layer. Nevertheless, the rise of an intervocalic _-j-_ suggests that diphthongs such as (Proto-)Baltic _*ei_ were not possible in Pre-Mordvinic.

Compared to the etymology of E _panst_, _panct_, M _pandə̂s_, _pandaz_, _panc_ ‘bridle’, it must be assumed, therefore, that the (Proto-)Baltic second-syllable _*-ias_ was treated differently in words with a first-syllable front and back vowel according to the rules of palatal vowel harmony.

(20) E ***penge***, M ***pengä*** ‘log, firewood’ (MdWb 1617–1618)
< PreMd _*pinki_ ~ _*pinkä_
< Baltic _*spingias-_, cf. Lithuanian _spiñgis, spìngis, spingỹs_ (_spiñgio_) ‘cross-cut, forest trail, glade’. The Lithuanian word originates from the stem _*speng-_ as the verb _spingė́ti_ ‘shine weakly, flutter, glitter’, _spingulỹs_ ‘spark’ does ((Fraenkel 1962–65: 871).

The Baltic word was originally compared (Wälchli 1997: 315–316) with Md E _pinks_, _piŋs_, M _piŋs_ ‘ring; ripe; barrel hoop; handle; bracelet’ (ÈRS 481; MdWb 1670). Nevertheless, this is not correct, because the Mordvinic word is a derivation of another Mordvinic word that is semantically much closer. Actually, it is derived from E _pinge_, M _pingä_ ‘time, period’ (MdWb 1673–1675). The meaning ‘ring etc’ is a metaphor expressing a completed time period, such as a full moon, a circular perception of the course of time. Mordwinisches Wörterbuch, which otherwise follows the etymological principle in the compilation of entries, erroneously separates the two Mordvinic words. E _pinks_, _piŋs_, M _piŋs_ ‘ring; ripe; barrel hoop; handle; bracelet’ is presented as a subentry of M _pinďəl_ ‘shine; light’, which, however, is structurally bimorphemic, too.

Compared to other etymologies, the vocalism of the Mordvinic word suggests that this word belongs to the earlier layer of Baltic borrowings in Mordvin.

(21) E ***puŕgińe***, ***puŕgińi***, ***piŕgeńe***, ***piŕgińe***, ***piŕgimä*** etc., M ***puŕgəńä***, ***pəŕgəńä*** ‘thunder’ (MdWb 1853)
< PreMd _*perkänä_ (~ _*perkini_ ~ _*porkini_)
< (Proto-)Baltic _*perkūnas_ (cf. Lith. _perkū̱́nas_ ‘thunder, flash’ ~ Latv. _pērkūns_ ~ OPr. _percunis_ ‘thunder’ (Thomsen 1890: 207; (Fraenkel 1962–65: 575)) > Fi. _perkele_ ‘devil; damn’ (SSA 2: 340)

This etymology has long been considered as one of the most plausible, although it is phonologically irregular, as the abundant variation shows. In principle, two different variants can be reconstructed in Proto-Mordvinic, namely one with a labial first-syllable vowel and another one with an illabial one PM **puŕgińä* ~ **piŕgińä*. Despite this, the labial variant *pu-* must be considered a secondary innovation in comparison with the illabial variant *pi-*, although possibly an early one. It is not possible to derive the Mordvinic *-i-* from *-u-*, whereas the latter one must have been influenced by the quality of the preceding labial consonant *p-*. Although the given word has an obvious loan etymology, the mentioned phonological detail is probably affected by this word's onomatopoetic character as well.

Another phonological question is the quality of the reconstructed first-syllable front vowel. If the Baltic source has **e*, which was presumably transferred as such to Pre-Mordvinic, the second-syllable vowel should have been open *ä*. Pre-Mordvinic **perkini* would imply Erzya **pergińe*, because PFU **e* was preserved, if the second-syllable vowel was not open. The reconstruction PreMd **perkänä*, in turn, suggests that the word was subject to a similar change as E *ińe*, M *ińä* 'big' < PFU **enä* and E *ńiĺe*, M *ńiĺä* '4' < PFU **neljä* (Bartens 1999: 56–59). Furthermore, it should be assumed that the third syllable **-nä*, though originally belonging to the stem, was reanalyzed as a diminutive suffix that is very productive in both Mordvinic languages (Al'amkina 2000: 18–20; Erzyan' kel' 2000: 37). This would explain why the second-syllable vowel is E *-i-*, M *ə* instead of E *-e-*, M *-ä-*. In Erzya, for instance, the second-syllable open vowel becomes closed in front of the diminutive suffix as in E *ćora* 'boy; son' : *ćorińe* (MdWb 186–187)*,* *lapa* 'paw, foot' : *lapińe* 'wing' (MdWb1021–1023) *tumo* 'oak' : *tumińe* (Luutonen & al. 2004: 154).

Unlike many other etymologies analysed in this list, E *puŕgińe*, *puŕgińi*, *piŕgeńe*, *piŕgińe*, *piŕgimä* etc., M *puŕgəńä*, *pəŕgəńä* 'thunder' probably represents a relatively old layer that underwent the same kind of vowel changes as those undergone by inherited Finno-Ugric words.

(22) E ***potmo***, ***potno***, M ***potma***, ***potmə̑*** 'inside; inner stomach; bosom; bottom' (MdWb 1764)

< PreMd **putma*

< (Proto-)Baltic **putmō*, cf. Lith. *putmuõ*, *putmenà* 'swollen place, swelling' (Wälchli 1997: 318–319); Lith. *pùsti* (: *puntú*, *putaũ*) 'swell, fatten, feed' etc. < PIE **peu-*, **pou-*, **pū̆-* 'swell' (Fraenkel 1962–65: 677–678).

In modern Erzya, the word is highly grammaticalised and frequently used as a postposition: *pots* 'into', *potso* 'inside', *potsto* 'from inside'. Historically, the word must belong to a relatively old layer, because it has undergone the same vowel change *u* > *o* as inherited Finno-Ugric words such as Md. E M *tol* 'fire' < PFU **tuli* and E M *moda* 'soil' < PFU **muta*.

(23) E ***pusmo***, M ***pusma***, ***busma*** 'bunch, bundle' (ÈRV 1993a: 529, ÈRV 1993b: 115, MRS 1998: 550), *čeŕ pusmo* 'tangle (of hair)' (ÈRV 1993a: 529)

< ProtoMd **pusma*

< (Proto-)Baltic **bužma-* (~ **buzma-*); cf. Lith. *bužmaš* 'bunch' etc.

Surprisingly, the Mordvinic word is not mentioned in Paasonens large Mordwinisches Wörterbuch (MdWb). Nevertheless, the word is attested in Erzya-Russian and Moksha-Russian dictionaries published in Saransk and other sources (Keresztes 1990: 148).

Semantically, the Mordvinic word does not deviate from the suggested Baltic original at all, which suggests that the borrowing is probably quite recent. The same is valid for the correspondence of Mordvinic first-syllable *u* to Baltic *u*. There are two irregular deviations from the expected replications in Mordvinic. Firstly, the Baltic *ž* should correspond to a devoiced *š* as the first part of a consonant cluster in Mordvinic. In Baltic loanwords, Baltic **š* is regularly represented as *š* ~ *ž* (conditioned) in Mordvinic (see, E *inže*, M *inži* 'guest', E *kšna*, *šna*, (Šokša) *kišna*, M *šna*, *šə̂na* above, and E *raško*, M *raška* below). Conceivably, an alternative explanation is that in the evidence of the Mordvinic word, the Baltic source language the form was **buzma-* with *-z-* instead of **bužma-*. It is also possible that *-ž-* in Lithuanian is secondary, as is often the case for the palato-velar sibilants *š* and *ž* (Stang 1966: 91–98).

(24) E ***raśke***, M ***raśkä*** 'relative, friend, (Pl.) kinship, affinity, tribe' (MdWb 1883)

< PreMd **ratas(-kä)* (cf. E *karks* and E *panst*; the expected result of PreMd **raski* would be E **rośke*)

< (Proto-)Baltic **radas*, cf. Latv. *rads*. The Latvian word is an etymological cognate of Lith. *ràsti* 'find, meet', Latv. *rast* 'find, be or become used to' etc. The Latvian noun *rads* 'relative, kinship, tribe' has more concrete nominal parallels in the Slavic languages, such as Russ. *род* 'relative, kinship', Ukr. *рід*, ORus. *родъ*, Czech *rod*, Pol. *ród* etc. (Fraenkel 1962–65: 700–701; Karulis 1992 II: 97–98; Pokorny 1959: 1153; Vasmer & Trubačov 1986–87 III: 490–491).

Synchronically, the Mordvinic word is bimorphemic, just as many of the words discussed in detail above (cf. 3. E *eŕke*, M *äŕkä*, *jäŕkä*, 19. E *panst*, *panct*, M *pandə̂s*, *pandaz*, *panc*, 21. E *puŕgińe*, *puŕgińi*, *piŕgeńe*, *piŕgińe*, *piŕgimä*, M *puŕgəńä*, *pəŕgəńä*). The given word consists of the stem, which does not occur independently in Mordvinic, and a productive (Alyamkin 2000: 20, Èrzyan' kel' 2000: 37–38) diminutive suffix E *-ke*, M *-kä* and can be attached to derived words, as in E M *piks* 'string, rope' etc. → E *pikske*, M *pikskä*; M *traks* 'cow' → *trakskä*, E M *sur* 'finger' → *surks* 'ring' → E *surkske*, M *surkskä* (MdWb 1658–1659, 2056–2059, 2334; Serebrennikov 1967: 68).

The suggested loan etymology is based on the assumption that the original stem has eroded considerably during the morphological adoption of the word and the second-syllable vowel was in connection with a secondary suffixation, as in the case of E *panst*, *panct*, M *panc* 'bridle' (but not M *pandə̂ s*, *pandaz*). Thus, the process could be the following: E *raśke*, M *raśkä* < PM **raśkä* ~ **raćkä* < *PreMd **ratas*(*-kä*). This explanation suggests that the palatalization of the sibilant **ś* occurred in Proto-Mordvinic under the influence of the prevocalic suffix after the loss of palatal harmony. The relationship between a palatalized and unpalatalized variant must be considered as parallel with that of E *uśke*, M *uśkä* ‘chain’ etc. and E *uskoms*, M *uskə̂ms* ‘drive, lead, bring’ etc. The Mordvinic dictionary by Paasonen et al. presents these words as independent entries, although it is based on an etymological structure and prefers to represent derivations as subentries of underived stems (MdWb 2481–2485). Historically, E *uśke*, M *uśkä* ‘chain’ is a dervation of E *uskoms*, M *uskə̂ms* ‘drive, lead, bring’. As regards the etymology of E *raśke*, M *raśkä*, it must also been alleged that the Pre-Mordvinic intervocalic *t* was either lost in connection with the loss of the second-syllable vowel *-a-* or there was an intermediate stage in which *t* and *s* merged and formed a palatal affricate *ć* that underwent a similar assibilation **ć* > *ś* as inherited Finno-Ugric words (Bartens 1999: 41–42; Keresztes 1987: 78–80, 140–147).

Finally, the existence of the sibilant motivates the Baltic origin of the given word. Slavic borrowings in Mordvinic have clear Slavic characteristics. The same Balto-Slavic stem was borrowed into Mordvinic later in another form in the following way: E M *raštams* ‘reproduce, breed’ (MdWb 1885) < ORus. *raždati* ‘give birth’ etc. ← *roditi* > Rus. *rodit́* id. (Stipa 1973b: 16). Likewise, there are other Mordvinic words in which more detailed analysis of the relationship between Baltic and early Slavic influence would be welcome (cf. E M *rudas* below).

(25) E ***raško***, M ***raška*** ‘the inner side of a corner, the place between legs; branch, fork (between fingers etc.)’ (MdWb 1883–1885) (? ~ Fi. *rahko* jne. ‘forked stick (to hold a fir torch)’ (with a plausible cognate in Karelian but not in other Finnic languages; SKES 713; SSA 3: 38; UEW 743))
< PreMd **raška*
< (Proto-)Baltic **raškā*, cf. Lith. *raškà* ‘forked stick for picking apples’ (Liukkonen 1999: 114–115).

(26) E ***ŕeďams***, ***ŕäďams***, M ***ŕäďams*** ‘notice, perceive, become aware; look for; choose’ (MdWb 1913)
< PreMd **rät́i-* ~ **räti-*
< (Proto-)Baltic **regē-*, cf. Lith. *regė́ti*, *regiéti* (*regiù*) ‘see’, Latv. *redzēt* ‘glimpse, sehen’ (Wälchli 1997: 319–320). Pokorny (1959: 854) is skeptical about the old Indo-European origin of the word (? < ieur. **reg-* ‘see’) and notes that the stem is attested in the Baltic languages and Albanian only. Fraenkel (1962–65: 712–713) assumes that the meaning of the Baltic word is secondary, but as the current etymology shows, certainly not a very recent change.

As both Erzya dialects and Moksha indicate, the Baltic first-syllable *e* was substituted with Mordvinic *ä*. Kallio (2008: 272) shows that a similar substitution is met in the Baltic loanwords of the Finnic languages as well, as both Finnic *e* and *ä* may correspond to (Proto-)Baltic first-syllable *e*. According to Kallio the Finnic *e* occurs earlier, whereas *ä* is mainly found in later loans.

The palatalization of Mordvinic *d́* indicates that the second-syllable vowel was historically a front vowel. Those etymologies that are discussed here do not clearly prove that a (Proto-)Baltic voiced plosive such as *g* in the given etymology would have been substituted with a voiced one in Mordvinic. On the contrary, the given etymology demonstrates that at the time the word was borrowed, there still were no voiced plosives in Mordvinic. Conceivably, intervocalic plosives became voiced only in a relatively late Proto-Mordvinic stage and voiced plosives did not belong to the phonological system of that language variant which adopted the Baltic loanwords. Wälchli (1997: 320) correctly points out that in (Pre-)Mordvinic there was no intervocalic *-g-* that would have corresponded to the Baltic one and it, or rather a palatalized variant **ǵ*, was therefore replaced with a palatal plosive *t́* (> *d́*) in Mordvinic. In fact, it is fairly common that in early Indo-European loanwords a palatal voiced plosive was compensated with a palatal consonant such as **ć*, **ś*, **j* in early Finno-Ugric (Uralic) variants (Koivulehto 1999a). There was no palatal plosive in Proto-Uralic or in Proto-Finno-Ugric (Sammallahti 1988), but as the present etymology suggests, the phonologization of new palatal phonemes such as **t́* took place at an early stage of Proto-Mordvinic (Pre-Mordvinic) (cf. Bartens 1999: 35–36). A parallel case is found in Latvian loanwords in Estonian dialects. The substitution of Latvian word-internal *ķ*, the voiceless pair of *ǵ*, is ambiguous. In many cases the new phoneme is adopted in Estonian, but sometimes it is substituted with the phonologically adjacent palatalised phoneme *t́* that may be depalatalized to *t* (Vaba 1997: 408).

Interestingly, there is another Mordvinic word with a possible but not completely unambiguous Baltic origin that lends further evidence to the treatment of voiced plosives in Proto-Mordvinic (Pre-Mordvinic), namely E *simeń*, M *śiməń* (see, below).

(27) E ***ŕiśme***, M ***ŕiśmä*** ‘chain; rope; string, ribbon’ (MdWb 1922–1923) (~ Fi. *rihma* ‘string’ etc. (attested in all Finnic languages; SSA 3: 72–73)
< ProtoMd **ŕiś(i)mä*

< (Proto-)Baltic **rišima-*, cf. Lith. *rišìmas* ‘binding’, Latv. *risamais* ‘string, ribbon’ ← Lith. *rišti* ‘tie, bind, knot; remove etc.’, Latv. *rist* ‘tie, bind; separate’, OPr *senrists* ‘bound’. The meaning ‘remove, separate’ originates from verbal particle constructions and a reanalysis of the verbal stem (Fraenkel 1962–65: 738). The Mordvinic noun illustratively reflects the participle form of the Baltic verb. The Baltic word was also borrowed into the Finnic languages (Finnish *rihma* ‘filament, thread’ with etymological cognates in all Finnic languages) and as a separate loan in Saamic (North Saami *riessan* : *riessama* ‘fringe, ruffle’ with cognates in most other Saamic languages) (Sammallahti 1984: 139; SSA 3: 72–73). Vaba (1983: 143) notes Mordvinic *ŕiś* as the stem, but as evidenced in Mordwinisches Wörterbuch (MdWb), the word consists of two syllables and, in fact, corresponds to the Baltic origin even more precisely.

On phonological grounds, the Mordvinic word is clearly a separate borrowing from Baltic, too. Baltic *š* should correspond to *š* in Mordvinic as well (cf. E *šenže*, *šeńš*, *šenš* 'duck' and E *šerže*, *šerže*, E:Nask *šaržə-*, M *šarža*, *šarža* 'grey hair; grey place in the head (also: on the field), greyhead' below). Thus, in Mordvinic the replacement of Baltic *š* with **s* ~ **ś* is contrary to expectations. The most reasonable explanation is that the sibilant was strongly palatal in the intervocalic position and, consequently, was substituted with **ś* in Proto-Mordvinic. Alternatively, in this word Lithuanian *š* is secondary and influenced by word-initial *r* as Baltic **s* changed to *š* in Lithuanian after *r* (Stang 1966: 91–98).

The vocalism of the Mordvinic word E *ŕiśme*, M *ŕiśmä* 'chain; rope; string, ribbon' shows that the borrowing does not share the changes of inherited Finno-Ugric words, just as many of the listed borrowings do not. Consequently, the Baltic first-syllable *i* corresponds to Mordvinic *i* instead of *e*, which is the regular correspondence in inherited Finno-Ugric vocabulary in Mordvinic (Bartens 1999: 56; Erkki Itkonen 1946: 300–301).

(28) E ***rudas***, ***urdas***, ***rudaz***, M ***rudas***, ***ə̑rdas***, ***ardas***, ***urdas***, ***urdaz*** 'dirt, mud' →
E *rudazov*, *urdazu*, M *ə̑rdazu*, *rudazu* 'dirty' (MdWb 1905–1906)
< ProtoMd **rudas* (~ PreMd **rutas*)
< (Proto-)Baltic **rudas*, cf. Lith *rùdas* '(red)brown, reddish, dark yellow', *raudà* 'red (colour)', Latv. *ruds* 'reddish, redbrown', *rauds* 'red, reddish', *rūda* 'swamp water; mud' < PIE **roudho-, rudh-ró-, rudh-wio-, rudh-so-* 'red'. The word denoting 'autumn' in the Baltic languages, namely Lith. *ruduõ*, Latv. *rudens*, originates from the same PIE stem (Fraenkel 1962–65: 704–705, 745; Karulis 1992 II: 132–133; Pokorny 1959: 872–873).

In the dictionary of Mordvinic (MdWb 1905), the given word is compared with Russian *ruda* 'dirty, muddy' assuming that it was borrowed from Russian. In Russian dialects, the word has other metaphoric extension such as 'blood; red soil etc.', as is also the case for different variants in the Baltic languages. However, the word-final sibilant in Mordvinic is not a derivational suffix, but belongs to the word stem and is found in a large number of both inherited and borrowed words. Therefore, it is possibly a Baltic loanword that is both phonologically and semantically motivated reflecting the masculine nominative ending -*s*. Phonologically, this word belongs to the same layer with several other Baltic loanwoards in Mordvinic that are clearly more recent than the inherited Finno-Ugric words because the treatment of first-syllable *u* was different from that of inherited words.

(29) E ***simeń***, M ***śiməń*** 'tribe, family' (MdWb 1980)
< PreMd **simeni* ~ **śimeni*
< (Proto-)Baltic **giminē-* (? **gimenē*), cf. Lith. *giminė̃* 'relatedness, family, tribe' (> Latv. *ģimene* 'tribe, family') ← *gim̃ti* 'be born, come into existence' OPr. *gimsenin* 'birth', *gemmons* 'born', OInd. *gámati*, *gacchati*, Av. *ǰimaiti*, *ǰasaiti* 'come', Goth. *qiman* id. etc. < PIE *$g^{u̯}$*em-* (Fraenkel 1962–65: 151; Pokorny 1959: 464–465; SKES 1008; SSA 3: 173; Thomsen 1890: 216). Semantically and from the viewpoint of syllable structure, the Mordvinic word matches well the Baltic noun derivation **giminē*, but phonologically the word-initial correspondence

between Erzya _s-_ (~ _ś-_) and Baltic _g-_ is problematic. As pointed out above (cf. E _ŕeďams_, _ŕäďams_, M _ŕäďams_ 'notice, perceive, become aware; look for; choose'), palatalized Indo-European voiced plosives were often replaced with palatal affricates and sibilants in early Finno-Ugric varieties. In this case Baltic _gi-_ suggests a rather palatal pronunciation of the given word, as shown by Latvian _ģimene_. However, the Erzya word-initial sibilant _s-_ is unpalatalized, which seems to refute the etymology on phonological grounds. As Bartens (1999: 43, 49) notes, PFU *_s-_ and *_ś-_ were kept apart in Proto-Mordvinic, whereas the opposition between other palatalized and unpalatalized consonants such as _l:ľ_ and _n:ń_ was mainly blurred in Proto-Mordvinic. In Moksha the merger took place between *_s_ and *_ś_ as well, but, in principle, Erzya maintained this distinction. This is seen in assumed Indo-European loanwords as well, such as E _siŕe_, _siŕä_, _sirä_, M _śiŕä_ 'old' and E _sirńe_ ~ M _śirńä_ 'gold' (Joki 1973: 314–315; MdWb 1985–1989; Paasonen 1897: 47). Consequently, the etymology is correct only, if a similar blurring that occurred between other palatalized and unpalatalized consonants could occur between *_s_ and *_ś_, too, and the unpalatalized *_s_ in Erzya is actually secondary with respect to *_ś_. The most likely phonological explanation for this is that the labial nasal _m_ that had no palatalized variant influenced regressively the palatalization of the first syllable that finally led to its loss.

The second assumption, even more crucial for this proposed etymology, is the substitution of Proto-Baltic _g-_ (~ *_ǵ-_) with Pre-Mordvinic *_ś-_. Basically, the replacement of a palatal plosive *_ḱ-_/*_ǵ-_ of the early Indo-European proto-language varieties with a palatal sibilant *_ś-_ in Finno-Ugric is attested in some very old borrowings, such as (Fi. _salko_ 'pole, rod', Md. E _śalgo_, M _śalga_ 'thorn, spine, sting' etc. <) PFU *_śalka_ < PIE *_ǵ_^{h}_alg_^{h}_o-_/*_ǵ_^{h}_alg_^{h}_ā-_; (Fi. _sanka_ 'handle, bail' <) PFU *_śanka_ < PIE *_ḱanku_; (SaaN _čuonja_ 'goose' <) PFU *_śanak_ < PIE *_ǵ_^{h}_an-_, *_ǵ_^{h}_an-əd_ / *_ǵ_^{h}_an-ud_; (Fi. _sora_ 'gravel, grit', Md. E _śuro_, M _śora_ 'corn, grain' (Koivulehto 1983: 113–120, 1999). Koivulehto (1983: 111) following Joki (1973: 303) notes that in Proto-Indo-European the palatalized plosives *_ḱ_, *_ǵ_ and *_ǵ_^{h} must have been strongly palatalized to be clearly opposed with the velar ones *_k_, *_g_ and *_g_^{h}. The problem with this well motivated explanation is that all parallel cases are very early borrowings. In Mordvinic, the first-syllable _i_ of inherited Finno-Ugric words combined with a non-open second-syllable vowel is regularly represented with _e_ in present-day Erzya and Moksha (Bartens 1999: 56, Erkki Itkonen 1946: 300–302). While this happens even in words with a word-initial PFU *_ś-_ such Md. E M _śejeľ_ 'hedgehog', the only explanation is that the Indo-European palatalised plosives could be replaced with a palatalised sibilant in Finno-Ugric proto-languages of a later layer, too.

Finally, it must also be noted that Baltic *_gimenē_ with a second-syllable _-e-_ would correspond better to Proto-Mordvinic second-syllable _-e-_. However, the word belongs to the earlier layer that was borrowed into Pre-Mordvinic. In inherited Finno-Ugric vocabulary no phonological distinction was made between second-syllable *_i_ and *_e_. Thus, the reconstruction *_giminē-_ based on Lithuanian is equally acceptable.

(30) E ***šenže***, ***šeńš***, ***šenš*** ‘duck’ (MdWb 2227)
< PreMd **šenši*

? < (Proto-)Baltic **žansis*; cf. Lith. *žãsìs* ~ Latv. *zoss* ~ OPr. *sansy* ‘Gans’ (Thomsen 1890: 247; Joki 1973: 57; Fraenkel 1962–65: 1292). The bridging of the Mordvinic word with the Baltic ones is a typical example of an etymology that does not match completely in terms of phonology and semantics but, yet, there are several reasons to assume that the Mordvinic word can be a Baltic loanword. The mentioned Baltic word was borrowed into Finnic (Finnish *hanhi* with cognates in almost all other Finnic languages (SSA 1: 138) in which the phonological and semantic correspondence is historically one to one. However, the Finnish etymological dictionaries (SKES 55; SSA 1: 138) do not mention the Mordvinic word at all, and hence do not consider it a cognate of the Finnic word. The reason is the mismatch between the front vowel in Mordvinic and back vowel in Finnic and Baltic.

The Mordvinic word has a relatively limited geographical distribution in Erzya dialects and it is not attested in Moksha at all. Semantically, it is obvious that ‘duck’ and ‘goose’ may overlap, as both belong to adjacent bird species. In Mordvinic, there are several synonyms for both birds, such as *ď́iga*, *gaga*, *gala*, *maćej* ‘goose’ and *jakśargo*, *pagańka*, *šenže*, and *utka* ‘duck’. Phonologically, there is a possibility that the first-syllable *e* derives from a historical *a* in E *šenže*, *šeńš*, *šenš* ‘duck’. The parallel evidence comes from E *šerže*, *šerže*, *šaržə*, M *šarža*, *šarža* ‘grey hair, grey place in the head (also metaphorically: on the field)’ in which the Erzya and Moksha variants do not correspond phonologically to one another (see, below). It must also be noted that there is another Baltic bird name in which the vocalism corresponds to the investigated word, namely Lithuanian (dial. Žemaitian) *génšė*, *gę́šė*, *gę́žė* ‘heron, stork’ (Fraenkel 1962–65: 137); however, the word-initial plosive *g-* and the more remote meaning ‘stork’ do not match with E *šenže*, *šeńš*, *šenš* ‘duck’.

(31) E ***šerž̦e***, ***šerž̦e***, E:Nask ***šarž̦ə-***, M ***šarž̦a***, ***šarž̦a*** ‘grey hair; grey place in the head (also: on the field), greyhead’ (MdWb 2228) (~ Fi. *harmaa* with cognates in other Finnic languages except Veps and Livonian; SaaS *siermag*, *šerma* ‘grey’ (SSA 1: 143))
< PreMd **šerši*

< (Proto-)Baltic (**šeršnas* ~) * *šar-*; cf. Lith. *šer̃kšnas* ‘ripe; frost’ (Fraenkel 1962–65: 973–974); cf. Lith *šir̃vas* ‘(blue)grey, mouldy’, also a different ablaut degree *šarvas* ‘grey’, and further Lith. *šìrmas* ~ *šir̃mas* (Fraenkel 1962–65: 989). As Liukkonen (1999: 37–40) notes, the Lithuanian form with a first-syllable *a* manifested in *šarmà*, *šar̃mas* ‘ripe, frost’ (Fraenkel 1962–65: 965) actually corresponds phonologically exactly with the Finnic variant.

As the Erzya and Moksha variants show, the difference of the vowel makes the etymology of the Mordvinic word ambiguous. Both Erzya and Moksha forms are completely lexicalised, as indicated by the adjectival derivations: E *čeržej*, *šeržej*, *šeržej*, *šeržev*, M *šaržu*, *šaržu* jne. ‘grey, with grey hair; fluffy;

grey hair, greyhead’. The Finnish etymological dictionaries do not explain why a back vowel in the Finnic word with would originate from a front vowel as suggested by the Lithuanian words *šir̃vas* ~ *šìrmas* ~ *šir̃mas*. SKES ([1955] 59) follows Thomsen (1890: 223) and Kalima (1936: 97) and presents only the words with a first-syllable *-i-* in Baltic, while the later SSA (SSA 1: 143) adds *šarvas* to the list. Both the Erzya and Moksha variants suggest that there used to be a word-internal sibilant in Proto-Mordvinic; however, the Erzya word can be derived from a Proto-Baltic reconstruction with a first-syllable *e* and the Moksha word with a first-syllable *a*. SSA actually assumes a parallel borrowing into Finnic and Saamic as the different ablaut degrees show.

Basically, it is possible to assume a similar convergence between the Erzya and Moksha and the preservation of an old phonological difference. Given that there is a lot of phonological variation in Baltic, this assumption seems well-motivated. Nevertheless, despite the discrepancy between Erzya and Moksha it is possible to assume that the Erzya variant with *e* is secondary and actually originates from a similar back-vowel ablaut degree as Moksha. Ravila (1929: 102), for instance, assumed that there used to be a back vowel in Erzya, too, as suggested by the Naskaftym variant *šaržə-* representing the southeastern dialects, though not attested elsewhere in Erzya. Thus, presumably in this case a secondary change took place in Erzya, as in the word E *śeja*, *śäja*, M *śava*, *śva* ‘goat’ < Proto-Md **ćava* < PreMd *ćaga* < Indo-Iranian, cf. Old Indian *chā̀gaḥ* ‘Bock [MASC]’, *chā̀gā* ‘goat [FEM]’ (also > Tatar (Mišär) *čaga* ‘Lamm’), *chagaláḥ* ‘buck; goat [MASC]’ (widely represented in Indo-Iranian languages), Oss. *sæg* ‘goat’ (Joki 1973: 317—318). However, there are also opposite cases, such as E *tŕavoga* ‘unrest, commotion, excitement’ (< Russ. *trevóga* id., MdWb 2339), in which the shift of word stress from the Russian second syllable to the Erzya first syllable has obviously affected the quality of the vowel.

Although the Proto-Baltic variant **šeršnas* seems to match the Erzya variants with a front vowel without any problem, the etymology can still be elaborated further. Actually, the Mordvinic word is bimorphemic and consists of a word stem and a denominal derivation suffix. As Serebrennikov (1967: 77) notes, for instance, this is a relatively frequent adjectival suffix, as evidenced in E *beŕań* ‘bad’ → *beŕaža*, E *keľej* ‘broad’ → *keľejža*, E *piže* ‘copper; green’ → *pižiža* etc. (none of these derivations attested in MdWb (124–125, 686–688, 1697–1700) and ÈRV; cf. Èrzyan kel’ 2000: 39).

(32) E M ***talaj*** ‘recently, lately; fair(ly)’ etc., derivations with local case suffixes M:Sel *talajs* (ILL) ‘for some time, for a certain period’, E:VVr *talajste* (ELA) ‘from a distance’ (MdWb 2258–2259)
< ProtoMd/PreMd **talaj*
< (Proto-)Baltic **tāl-u/i-*; cf. Lith. *tolùs* ‘remote, distant’, *tolì, toliẽ* id. ~ Latv. *tāls* id., *tālums* ‘distance, remoteness’ ~ OPr. *tālis* (adv.) ‘further’; ~ Russ. *dal′* ‘distance’ → *daleko* ‘in a distance’) (Fraenkel 1962–65: 1106–07; Vasmer & Trubačov 1986–87: 483)

Paasonen (1897: 53) and Räsänen (1969: 458) consider this word a Turkic loanword but do not mention any corresponding words in the Turkic languages of the Volga region. They compare the Mordvinic word with Turkic *talaj* 'much, abundant' and forms in more southern Turkic languages such as Kazakh *talaj* 'some, a little' that, in principle, could correspond to the Mordvinic word.

According to Fraenkel (1962–65: 1106–07), the etymology of the Baltic word is not unambiguous. From the perspective of the Mordvinic languages, the point is that Proto-Baltic **ā* was substituted with ProtoMd/PreMd **a*. A late Slavic borrowing would most probably be reflected with a word-initial *d-*, as usually has been the case for Russian loanwords with word-initial *d-*. Erzya follows this pattern regularly. In Moksha, Russian *d-* often becomes *t-*, as in E *dosadna*, M *tasadna* 'annoyingly, vexedly' (< Russ. *dosadno* id.), E *doska*, M *toska* 'table' (< Russ. *doska* id.), E *dosuž*, M *tasuš* 'agile, skillful' (< Russ. *dosužij* id.), E *dratva*, M *tratva* 'wax end' (< Russ. *дратва* id.), E *drug* M *trug* 'friend' (< Russ. *drug* id.), E *dum*, M *tum* 'advice, plan' (< Russ. *duma* id.) (MdWb 322–330). However, the phonological structure of the given Mordvinic word does not have parallels in Slavic either.

Another point concerning the reconstruction of the first-syllable vowel in Baltic as both **ā* and **ō* might come into question. Fraenkel (1962–65: 1105) assumes that the Baltic word historically originates from the pronominal stem **to* (cf. Lith. *tõl*, *tõlei* 'until then, so long', Latv. *tālīt* id.; OChSl *toli* 'to that extent', *tolʹ* 'so (very) much' (> Russ. *tolʹko* 'only'). Thus, historically **ō* would represent the original vowel in Baltic, although normally Latvian *ā* is more conservative compared with Lithuanian *ō*. As regards the given etymology, a short Proto-Baltic **o* is excluded, because a PFU/Pre-Mordvinic **o* cannot be represented as *a* in Proto-Mordvinic. This distinction between the long vowels **ā* and **ō* is probably not crucial from the viewpoint of Mordvin vowel history, because there was no **ā* in Pre-Mordvinic or Proto-Mordvinic, and PFU **ō* is represented as *a* in Proto-Mordvinic, as PFU **a* is the other possible substitution for Proto-Baltic **ā*. However, this development is attested only in nouns, which have eroded to one-syllable stems (Bartens 1999: 55). For the sake of comparison, in Finnic, Proto-Baltic **ā*/**ō* frequently becomes Proto-Finnic **ō* (Stang 1966: 24; Kallio 2008: 272, Koivulehto 2000).

(33) E ***turtov*, *tortov, turtuv, turto(n)*** [Postp.] 'to; for' (MdWb 2353–2354)
< ProtoMd **turt(t)a*

? < (Proto-)Baltic **turta-*; cf. Lith. *turtas*, *turtie* 'wealth, property' ~ Latv. *turta* 'fortune, property' (Fraenkel 1962–65: 1145; Wälchli 1997: 317–318).

The plausibility of the etymology is not unambiguous for two reasons. Firstly, the given loanword should be, as several other ones in the list above, clearly of a more recent origin than inherited Finno-Ugric words. Phonologically, Pre-Mordvinic **turta* would correspond to E **torda*, while the alternative PreMd **turti* would correspond to E **tordo.* So, a more recent origin than Pre-Mordvinic is more likely, just as in the case of some other investigated etymologies. In this list of Baltic loanwords in Mordvinic, the given etymology is the only one in which a voiceless plosive following a voiced consonant in Mordvinic corresponds to a voiced plosive in Baltic. In principle, there are two possible explanations for the existence of *rt* that either prove the late origin of the Mordvinic word or descend from a historical **rtt* with a geminate plosive. There is no evidence that the latter would have been the case in the given word, as there is no cognate form in Moksha. However, this possibility cannot be completely excluded, as there are numerous parallel cases in the Finnic languages. In both Germanic and Slavic loanwords, in sequences consisting of a voiced consonant and a voiceless plosive, the substitution of the consonant cluster is based on the lengthening of the plosive in Finnic. The following examples show a more long-term phonological substitution of Indo-European loanwords in western Finno-Ugric (Finnic): Finnish *hurtta* 'hound, big dog' etc. (with cognates in several other Finnic languages) < Russian *hort* (SSA 1: 192), Finnish *markka* 'mark (money)' (with cognates in most Finnic languages) < PF **markka* < PGerm *markā* (SSA 2: 150), Finnish *nartta* 'a light (reindeer or dog) sledge' < Russian *nárta* (SSA 2: 207), Finnish *paikka* 'place; scarf' etc. (with cognates in all Finnic languages) < PGerm *spaikā* (Koivulehto 1981: 195–199; SSA 2: 288–289), Finnish *palkka* (with cognates in all Finnic languages (SSA 2: 301)) < East Slavic *bologo* (Saarikivi 2009: 139–144), Finnish *verkko* 'net' (with cognates in all Finnic languages) < PF *verkko* < PGerm *werko-* (SSA 3: 428). Assuming that this kind of substitution was possible in other early Finno-Ugric varieties such as Pre-Mordvinic and Proto-Mordvinic, the etymology of E *turtov*, *tortov*, *turtuv*, *turto(n)* is phonologically fully plausible.

Secondly, the etymology suggests that a grammatical reanalysis took place contemporaneously in connection with the language contact and followed the borrowing of the Baltic word in Mordvinic. As Wälchli (1997: 317–318) notes, the Mordvinic word occurs as a postposition and there is no noun that would correspond to the Baltic origin, although one would expect this. More generally speaking, it is maintained that grammatical elements are not borrowed from one language to another as easily as nouns. The syntactic order of the constituents, case government of adpositions, and morphosyntactic properties ruling adpositional phrase often limit the borrowing of grammatical units such as adpositions to another language (Grünthal 2003: 199). In general, grammatical borrowing suggests intensive lexical borrowing that presumably should be more clearly seen in the lexicon than the apparent Baltic influence on Mordvinic. However, the current list includes several other examples of units manifesting grammatical relations, namely E *lango*, M *langa* 'surface, cover; low', E M **mala* 'close environment; next, surrounding' : E *malaso*, M *malasa* 'near [INE]' etc. and E *potmo*, *potno*, M *potmă*, *potmə̑* 'inside; inner stomach; bosom; bottom' that all display spatial functions (see, above). This suggests that a more detailed analysis of the etymology of the given words should account for the development of relational nouns in language contact. It must also be noted that in Mordvinic there are other postpositions that are transparent borrowings from Tatar, namely E *baška*, E M *paška* (Adj.) 'special, separate', (Postp.) 'except of, in addition to'

< Tatar *baška* (MdWb 120) and E *karšo* (: *karšov*), *karčo*, E M *karša*, M *karšə̂* (: *karšə̂k*) ‘against’ etc. < Tatar *karšə* (MdWb 615–617).

(34) E ***t́eŕd́ems***, ***t́äŕd́ems***, ***t́eŕd́ims***, ***t́eŕgems*** etc., M ***t́eŕd́əms*** ‘call; invite’ (MdWb 2389–2390)
< PreMd **tirti-*
< (Proto-)Baltic **tirdi-*, cf. Lith. *tìrti* ‘learn, find out; search; examine’, *tirdinė́ti*, *tyrinė́ti* [FREQ] ‘search, ask several times’ ~ Latv. *tirt*, *tirdināt* [FREQ] ‘(to) question, interrogate’, *tirdīt* ‘badger, interrogate persistently; disturb, curse, persuade’ etc. (Fraenkel 1962–65: 1102; Karulis 1992 II: 409–410).

Phonologically, this etymology represents the Pre-Mordvinic layer, because in Mordvinic the first-syllable *-e-* corresponds to Baltic *-i-* as in inherited Finno-Ugric vocabulary (cf. E *kirda*, M *kə̂rda* above). Synchronically, the word-internal voiced plosive *-d-* is identical with the momentative derivational suffix, which adds the relevance of aspect of the given verb. In Mordvinic, a word-internal element is sometimes reanalysed as a verbal derivative suffix, as in the deadjectival (E *naksado*, E M *naksada* ‘decayed, rotten’) → E *naksadoms*, M *naksadə̂ms* ‘rot, moulder’ (MdWb 1311–1312; Serebrennikov 1967: 231).

(35) E ***t́ožań***, ***t́užäń***, M ***t́ožän***, ***t́ožäń***, ***t́ožəm*** ‘1000’ (MdWb 2411–2412) (~ Fi. *tuhat* ‘1000’ (attested in all Finnic languages) ~ Ma. H *təžem*, M *tüžem* id. (SKES 1374; SSA 3: 318))
< PreMd **tušanti* ~ **tušamti*
< (Proto-Baltic) **tū́(k)stantis*, cf. Lith. *tū́kstantis* ‘1000’ ~ Latv. *tūkstuõt(i)s* ~ OPr. *tūsimtons* [PL.ACC] id. (Kalima 1936: 57, 170–171; Joki 1973: 319; Thomsen 1890: 232–233). This etymology, along with many others, was originally suggested by Thomsen.

Phonologically, this etymology is basically solid and one of the rare plausible ones that could support the assumption of shared Baltic borrowings in the Finnic and Mordvinic languages. In principle, the reconstruction **tušanti* is correct for both (Early) Proto-Finnic (cf. the inflection of Finnish *tuhat* thousand. NOM : *tuhanne-n* thousand-GEN) and Pre-Mordvinic. However, in Mordvinic there are several details that diverge from the expected form based on the reconstruction and need to be discussed, namely the palatal word-initial *t́-* and the second-syllable palatal vowel *ä* and the quality of the word-final nasal *n* ~ *ń* ~ *m*. The rise of a palatal *ń* is probably motivated by the reanalysis of *n* as the word-final unit because the palatal *ń* is identical with the genitive *ń*. Syntactically, the genitive is typically used in a pre-nominal position as a determiner of a syntactic dependent that is comparable with the pre-nominal position of numerals, such as ‘thousand’, as quantifiers of nouns. If this assumption is correct, the palatalisation of the second-syllable vowel *a* > *ä* can be explained as a result of regressive assimilation of the vowel with the palatal nasal.

Nevertheless, on the one hand, it is hard to see that the regressive palatalisation, regardless of how productive it is, would have caused the palatalisation of the word-initial *t́*. As the older version of the Finnish etymological dictionary notes, the rise of a palatal *t́* in the given word is irregular (SKES 1374; cf. Bartens 1999: 35–36; Keresztes 1987: 59–62). As all Mordvinic variants suggest, the palatalisation of the word-initial *t́* took place already in Proto-Mordvinic. On the other hand, regressive assimilation, stress shift in Proto-Mordvinic (Erkki Itkonen 1971–72), and the reanalysis of palatal harmony is probably the best available explanation for the palatalisation the word-initial *t́* we have.

The substitution of Baltic **s* with Finno-Ugric **š* has several parallel cases in the earliest layer of Germanic loanwords in Finnic such as Fi. *halpa* 'cheap' etc. < (early) Proto-Finnic **šalpa* < Proto-Germanic **salwa-z* and Fi. *hauta* 'grave' etc. < (early) Proto-Finnic **šavta* < Proto-Germanic **sauÞa-z* etc. (LÄGLOS 1: 60–134).

Finally, the attestation of a word-final *-m* in the Moksha dialects of Penza triggers the question whether it is a local innovation or an archaism. The inflection *t́ožəm* thousand.NOM : *t́ožmə-ń* thousand.GEN (quoted from MdWb 2411) suggests that in this dialect, the old inflectional pattern was preserved and, as an exception to the rule that the word-final **-m* changed to **-n* in Proto-Mordvinic as it did in Proto-Finnic, in the given case word-final *-m* was preserved. If this assumption is correct, the connecting of the Finnic and Mordvinic variants with the Mari one is well-motivated and a correct Proto-Finno-Ugric reconstruction should rather be **tušamti*. However, given that there are very few Baltic loanwords in Finnic and Mordvinic that have any kind of possible cognate in Mari, and even fewer with an accepted cognate, the given word is more likely a parallel rather than a shared borrowing. In Mari, the first-syllable *ü* is also problematic but it will not be discussed in more detail here.

(36) E ***viŕ***, M ***viŕ***, ***viŕä*** 'forest' (MdWb 2661–2665)
< ProtoMd **viŕə* ~ **viŕä*
< PreMd **vēri*
< (Proto-)Baltic **vēr-i/e-*, cf. Latv. *vēris*, *vēre* 'a big forest, a big deciduous forest' jne. < PIE. **u̯er-* 'wide, broad' jne. (Mülenbach & Endzelin IV: 561–562; Karulis 1992 II: 508–509).

Phonologically, the etymology is not unambiguous, because in inherited Finno-Ugric vocabulary nouns with a PFU **ē*, the long vowel corresponds to Proto-Mordvinic **ɛ* [~ **ä*], Erzya *e*, Moksha *ä*, as in **kēli* > E *kel′*, M *käl′* (Bartens 1999: 55; Bereczki 1988: 320–321; Erkki Itkonen 1946: 311–315; Sammallahti 1988). However, as Erkki Itkonen (1946: 311) notes, there is a regular dichotomy in the development of PFU **ē* in Mordvinic. In addition to Erzya *e*, Moksha *ä*, Proto-Mordvinic **i* is the other regular correspondence, although mainly attested in verbs. Bartens (1999: 58) points out that there is at least one noun, namely E *simeń*, M *śiməń* 'tribe, family' in which this would be the case and gives the reconstruction **sēmen* for Proto-Mordvinic. As a matter of fact, this word is a Baltic loanword, too (cf. above), but there seems to be no reason to reconstruct a Pre-Mordvinic **ē* in this case.

Nevertheless, the given etymology is phonologically plausible, if a similar development PFU **ē* > Proto-Mordvinic **i* is assumed as in the case of certain inherited verbs, such as as Md E *ńiľems*, M *ńiľəms* ‘swallow’ ~ Finnish and Md E *śimems*, M *śiməms* ‘drink’ ~ Finnish *siemata* ‘gulp down, take a gulp’ (with cognates in Estonian and Livonian; SSA 3: 172; UEW 773) as proposed by Erkki Itkonen (1946: 311) and Bartens (1999: 58; cf. Sammallahti 1988: 546).

		Saamic	Finnic	Mari
(1)	E ***al***, M ***al*** ‘egg’	–	+	–
(2)	E ***čonda***, ***čando*** ‘price; value’	–	+	–
(3)	E ***eŕke***, M ***äŕʽkä***, ***jäŕʽkä*** etc. ‘lake, pond’	+	+	+
(4)	E ***inže***, M ***inži*** ‘guest’	–	(+)	–
(5)	E ***kardas*** ‘yard’	–	–	–
(6)	E M ***karks*** ‘belt’ etc.	–	–	–
(7)	E ***kerč***, ***kerš***, ***käŕč***, M ***ker***^{ď}***ži***, ***keŕži***, ***kärži***, ***kerš***, ***keŕeš*** ‘left’	–	–	–
(8)	E ***kirda***, M ***kə̂rda*** ‘turn; habit, manner’ etc.	–	+	–
(9)	E ***kodor***, M ***kodə̂r***, ***kodə̂rks*** ‘(plant’s) stake’	–	(+)	–
(10)	E ***kšna***, ***šna***, ***kišna***, M ***šna***, ***šə̂na*** ‘strap’	–	+	(+)
(11)	E ***lango***, M ***langa*** ‘surface, cover; low’	–	–	–
(12)	M ***luv*** ‘space between two fingers’	(+)	(+)	(+)
(13)	E ***luvoďems***, ***lungịďums***, M ***lungə̂ďəms***, ***luvə̂ďəms*** ‘loosen’ etc.	+	+	–
(14)	E ***ľepe***, M ***ľepe*** ‘alder’	–	(+)	–
(15)	E ***ľija***, ***iľa***, M ***ľijä***, ***iľe***, ***iľä*** ‘another, else’	–	(+)	–
(16)	E M ****mala*** ‘next, surrounding’ etc.	(+)	+	–
(17)	E ***mukoro***, ***mukura***, ***mukor***, ***nukur***, M ***mə̂kə̂r***, ***mukə̂r*** ‘back’ etc.	–	–	–
(18)	E ***panst***, ***panct***, M ***pandə̂s***, ***pandaz***, ***panc*** ‘bridle’	–	–	–
(19)	E ***pejeľ***, ***pejiľ***, ***päjeľ***, ***pijeľ***, M ***pejəl***, ***pejeľ***, ***peľ*** etc. ‘knife’	–	–	–
(20)	E ***penge***, M ***pengä*** ‘log, firewood’	–	–	–
(21)	E ***puŕgińe***, ***puŕgińi***, ***piŕgeńe***, ***piŕgińe***, ***piŕgimä***, M ***puŕgəńä***, ***pəŕgəńä*** ‘thunder’	–	(+)	–
(22)	E ***potmo***, ***potno***, M ***potma***, ***potmə̂*** ‘inside; inner stomach’ etc.	–	–	–
(23)	E ***pusmo***, M ***pusma***, ***busma*** ‘bunch, bundle’	–	–	–
(24)	E ***raśke***, M ***raśkä*** ‘relative, friend’ etc.	–	–	–
(25)	E ***raško***, M ***raška*** ‘inner side of a corner’ etc.	–	+	–
(26)	E ***ŕeďams***, ***ŕäďams***, M ***ŕäďams*** ‘notice’ etc.	–	–	–
(27)	E ***ŕiśme***, M ***ŕiśmä*** ‘chain; rope; string’	(+)	(+)	–
(28)	E M ***rudas*** etc. ‘dirt, mud’	–	–	–
(29)	E ***simeń***, M ***śiməń*** ‘tribe, family’	–	–	–
(30)	E ***šenže***, ***šeńš***, ***šenš*** ‘duck’	–	+	–
(31)	E ***šerže***, ***šerže***, ***šaržə-***, M ***šarža***, ***šarža*** ‘grey hair’ etc.	(+)	(+)	–
(32)	E M ***talaj*** ‘recently’ etc.	–	–	–
(33)	E ***turtov***, ***turto***, ***tortov*** ‘to; for’	–	–	–
(34)	E ***ťeŕďems***, ***ťäŕďems***, ***ťeŕďims***, ***ťeŕgems***, **M** ***ťeŕďəms*** ‘call; invite’	–	–	–
(35)	E ***ťožań***, ***ťužäń***, M ***ťožän***, ***ťožäń***, ***ťožəm*** ‘1000’	–	+	+
(36)	E ***viŕ***, M ***viŕ***, ***viŕä*** ‘forest’	–	–	–

Table 2. The distribution of assumed Baltic loanwords in Mordvinic with a possible shared or convergent borrowing in the Saamic, Finnic or Mari languages. Convergent borrowings are marked with brackets ().

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Why *Baba-Yaga*? Substratal phonetics and restoration of velars subject to the Progressive Palatalization in Russian/Belorussian and adjacent areas (appr. 600–900 CE)

1. The problem

Thanks to the penultimate movement of Mussorgsky's *Pictures at an Exhibition* (1874), one need not have grown up Russian to know about the witch going by the name of *Bába-Yagá*. What is less familiar, however, is the problem of Slavic historical phonology her name implies.

In the second component of the witch's name – the first component just means 'woman' – Russian stem-final *-g-* corresponds with the reflex of PSl **-dź-* found elsewhere in Slavic, e.g. Polish *jędza* 'witch'. Here PSl **-dź-* reflects early Slavic **g* as modified by what is known as the Progressive Palatalization, henceforth referred to as "Prog".

The problem here is the following: why does the Russian word appear to have escaped Prog? After all, Prog is a Common Slavic development well-attested in Russian in unquestionably authentic local vocabulary, e.g. *ovca* 'sheep', *jajco* 'egg', *zajac* 'hare', *ptica* 'bird', *scat′* 'piss', *ves′* 'whole, all', reflecting – using traditional notation – pre-palatalization suff. **-ьka*, suff. **-ьko*, **zaękъ*, **pъtika*, **sьkati*, **vьxъ*. Hence, starting from PSl **ędźa* (< pre-palatalization **ęga*) what one would expect on the basis of plausible sound laws is something like ***jazja*, but what we find is *jaga*. This is the problem the present contribution is about.

Baba-Yaga is not unique. As a matter of fact, many words with stem-final velars subject to Prog occur with unmodified velars at least somewhere in Slavic. Although the geography of the two contrasting treatments is not the same in every type of case, unmodified velars massively concentrate in the Russian/Belorussian dialect area, henceforth "R/BR". Indeed, in R/BR palatalized velars appear to be absent from authentically native material except for three types of cases:

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Suomalais-Ugrilaisen Seuran Toimituksia =
Mémoires de la Société Finno-Ougrienne 266.
Helsinki 2012. 345–370.

1. nouns with stems ending in the reflex of **k*;
2. the pronoun *ves′*, in which unmodified *-x-* also occurs, but only in the Novgorod/Pskov area.
3. the underived verb *scat′*.

In this contribution I would like to propose an explanation in terms of local differences having to do with the phonology of the consonant system and probably reflecting substratal differences.

2. The Progressive Palatalization of Slavic

Unfortunately the hypothesis that is advanced in this contribution presupposes a fairly complete understanding of the Progressive Palatalization. Since that subject is too complicated to be given its proper due in introductory handbooks, some space will have to be devoted to introducing it here.[1]

I would like to stress at the outset that there is no justification for the feeling that the Progressive Palatalization is a subject somehow too hot to touch. Given standard assumptions about how language changes, all essentials are beyond reasonable doubt. As I see it, the malaise surrounding Prog, rather than reflecting difficulties inherent in the problem itself, appears to be primarily of a communicative nature. Scholars have massively tended to ignore or misconstrue the results of earlier research and to disagree about points there are no good reasons to disagree about. Alongside the testosterone-driven nature of much debate in historical reconstruction, I suspect linguistic factors are partly to blame for this. Few Slavists can read both French and Polish, which happen to be the languages in which the most important literature on the subject is written.[2]

2.1. Transcription

In the period discussed here (very approximately 600–900 CE), the phonology of Slavic was rapidly changing and all the time giving rise to new local differences. This raises the practical problem of how to transcribe the examples to be given below, because, obviously, any attempt to precisely express all plausibly reconstructible local and temporal differences in them would tend to impede understanding and clutter up a text that is pretty complicated as it is.

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[1] See Vermeer (2002–03) for a more general overview of the subject.

[2] French: Meillet (1900, 1902–05, 1934), Trubetzkoy (1922), Nitsch (1926), Belić (1928), Vaillant (1950), Martinet (1952); Polish: Lehr-Spławiński (1911), Milewski (1937), Jeżowa (1968). Cf. also Zubatý (1910), which is in some ways *the* most important single publication on the subject and happens to be in Czech. Work in Polish and Czech has received little attention outside the West Slavic lands. Of publications in French it is only Trubetzkoy's "Essai …" (1922) and the two great handbooks (Meillet 1934, Vaillant 1950) that are referred to more than sporadically. As fate would have it, all three texts, indispensable as they are in many respects, go out of their way to hide the scholarly literature from view. For some discussion see Vermeer (2003).

Since, then, drastic normalization is inevitable anyhow, reconstructed examples will be presented as much as possible in the traditional transcription, i.e. one reflecting the state of the language attested in OCS, or rather normalized OCS, corresponding to the decades immediately preceding and following 900 CE, but with the most important dialectal characteristics of OCS removed. This presupposes in the reader the willingness to mentally transpose the examples into whatever shape they can be assumed to have had in the period under discussion.

The most important departure from this practice has to do with the reflexes of velars modified by the Progressive and Second Regressive Palatalization (henceforth "Reg2"). These will be transcribed as **ć*, **dź*, **ś* in examples presented as pre-dialectal Common Slavic. In examples presented as dialectal the transcription of these consonants will reflect the changes as discussed in the accompanying text. The other important departure concerns the nasal vowel reflected as **ę* in South Slavic and as **ě* elsewhere, which will be transcribed here as **ę̌*.

2.2. Conditions and chronology of Prog

What follows here is a brief account of Prog incorporating the tenable insights that have been reported in the literature:

1. A velar was palatalized if it was immediately preceded by **i* reflecting long **ī* (but not **ei* or umlauted **ū*), **ь* reflecting short **i* (but not umlauted **u*) or **ę* reflecting **į* (but not earlier **ę*). However, velars preceded by these vowels remained unchanged if they were followed by a consonant or a back vowel. It is not completely clear which back vowels did or did not block Prog: **y* did so in any case and its then short counterpart **ъ* is likely to have done so, **o* and **a* did not, while the effect of **u* and **ǫ* has so far proved impossible to determine because the evidence appears to be too limited to force a decision, or even suggest one. For the time being most scholars assume that **u* and **ǫ* did not block Prog. The lack of clarity about the scope of the blocking rule is the most important point where even a reasonable degree of certainty about the conditions for Prog has so far proved out of reach.[3]

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[3] For the difference between preceding **ei* and **ī* see see Meillet (1934: 92), Milewski (1937: 9), Vaillant (1950: 53), Vermeer (2008: 545–548). On preceding umlauted **ū* and **u* see Meillet (1902–05: 336) and Belić (1921: 34). The assumption that preceding **į* had a different effect from **ę* is implicit already in Baudouin de Courtenay (1893: 15, 17n, 1894: 47). Yet, although the point has cropped up often in the literature (beginning with Lehr-Spławiński 1911: 146–147 and Trubetzkoy 1922: 227), it has never been adequately discussed, possibly because clinching examples of **ę* (as distinct from **į*) in the required position appear to be lacking. For the blocking effect of following back vowels see Zubatý (1910: 150–151), Lehr-Spławiński (1911: 143–144), and most later investigators. Trubetzkoy's influential view that **-ъ* did not block Prog (1922: 233) hinges crucially on a factual mistake and gives rise to undesirable complications (Belić 1922–23: 136, cf. also Vermeer 2008: 533–538). The blocking effect of following consonants is so obvious – see already Gebauer (1894: 314) – that it has never been adequately documented; for the time being we have to make do with Belić (1921: 25, cf. also Vermeer 2008: 511n). An important contributary reason why the formulation

2. Everywhere in Slavic, Prog and Reg2 have identical outcomes, except in the Novgorod-Pskov area, where Reg2 appears not to have taken place at all, as Andrej Zaliznjak established in the nineteen eighties (Zaliznjak 1982: 61–75 = 1986: 111–122, cf. 2004: 41–47).
3. In the course of time various kinds of evidence have been brought to bear to show that Prog and Reg2 did not coincide in time. Since none of that has survived critical scrutiny, there are at present no good reasons to separate Prog from Reg2. They should rather be regarded as two sides of a single bidirectional palatalization rule, which will be referred to here as “Reg2 & Prog”.[4]
4. As for chronology, Reg2 & Prog took effect at a stage that postdated the monophthongization of diphthongs, which gave rise to the conditions for Reg2, but predated three changes which rendered the environment for Prog opaque and probably operated closely together not very long after the monophthongization of diphthongs:
    - The merger of monophthongized **ei* with **ī*, because **ei* does not trigger Prog and **ī* does.
    - The lowering of **į* which caused it to merge with **ę*, because Prog was not otherwise triggered by non-high front vowels.
    - The delabialization of early Slavic **u* and **ū* (attested *ъ* and *y* respectively), because Prog is not triggered by the reflexes of umlauted **ъ* and **y*.

2.3. Words subject to Prog

The number of distinct items credibly displaying **ć*, **dź*, **ś* attributable to Prog does not exceed twenty. In many cases part of Slavic presents unmodified *k*, *g*, or *x*. The examples are the following (canonical OCS unmarked):

1. Nominal suffix **-ića*, e.g. *tьmьnica* ‘prison’ (< *tьmьnъ* ‘dark’).
2. Nominal suffix **-ьća*, e.g. NApl *dvьrьcę* ‘door, window’ (< *dvьrь*, usually plural, ‘door, gate’).
3. Noun **ędźa*, e.g. *ędza* ‘illness’. Unmodified **g*, as in *Bába-Jagá*, is the norm in R/BR and attested in Ukrainian alongside *-z-* reflecting **-dź-*.[5]

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given in the text is so widespread is that in addition to accounting best for the low-level facts it yields a palatalization rule that makes simple phonetic sense: velars were palatalized by preceding high front vowels (**i*, **ī*, **į*) unless a consonant or a high rounded vowel (**u*, **ū*) followed, with the role of mid rounded vowels (**ǫ*, **ō* < **ou*) being undetermined.

[4] For discussion of these problems see Vermeer (2000, 2006, 2008).

[5] Whereas **ędźa* means ‘witch’ in West and East Slavic, in South Slavic its meanings vary from ‘illness’ in OCS to ‘anger’ in Slovene by way of ‘horror’ in SCr.

4. Noun *_lьdźa_, e.g. _polьdza_ ‘usefulness, benefit’. Unmodified *_g_ is the norm in R/BR (_pol′ga_), Ukrainian (e.g. _pil′ha_), and Lechitic (e.g. Polish _ulga_ ‘relief, alleviation, mitigation, etc.’, and several similar compounds).[6]
5. Noun *_stьdźa_, e.g. _stьdza_ ‘path, road’. Unmodified *_g_ (_stega_) has been reported for R/BR and very marginally for Polish (Pracki 1907: 264, cf. Zierhoffer 1959: 69).[7]
6. Noun *_elьśa_ ‘alder tree’ as attested most convincingly in eastern Slovene dialects, and also in Croatian toponyms of the shape _Jelsa_ (for the facts see in particular Šivic-Dular 1998: 165–166). Most of Slavic has unmodified -_x_- in this word, which unfortunately is not attested in OCS and offers additional complications.
7. Nominal suffix *-_ьćь_, e.g. _kupьcь_ ‘tradesman’ (< _kupiti_ ‘buy’).
8. Noun *_měsęćь_, e.g. _měsęcь_ ‘moon, month’. The modified velar is virtually Common Slavic.
9. Noun *_zaęćь_, e.g. Dpl _zajęcemъ_ ‘hare’. Unmodified -_k_- is attested in geographically unconnected areas in all three branches of Slavic.
10. Noun *_orbotędźь_ as reflected in Old Polish _robociądz_ ‘boy’, Old Czech _robotěz_ ‘slave’. Old Russian has _rabotjagъ_ ‘slave’ with unmodified -_g_-.
11. Noun *_vьśь_ denoting toxic plants requiring moist soils (e.g. cowbane), as attested in such forms as Ukr _ves′_, dialectal Cz _veš_. Unmodified stem-final *-_x_- is attested in R _vëx_. This example was identified only recently (Minlos 2001, Minlos and Terent’ev 2002). Like *_elьśa_ (6), it is not attested in OCS and offers various additional complications.
12. Nominal suffix *-_ьće_, e.g. _čędьce_ ‘child’ (< _čędo_ ‘child’).
13. Noun *_lіće_, e.g. _lice_ ‘face’. The modified velar is virtually Common Slavic.
14. Noun *_pьćьlъ_, e.g. _pьcьlъ_ ‘pitch’. The modified velar is limited to a single OCS manuscript (Codex Suprasliensis). Otherwise unmodified -_k_- is pan-Slavic.
15. Adjective *_nićь_, e.g. _nicь_ ‘facing downward’.
16. Pronoun *_vьśь_, e.g. _vьsь_ ‘all’ and derivations from the same root (notably *_vьśakъ_ ‘of all kinds’). Although the palatalized velar is nearly pan-Slavic, unmodified -_x_- is the norm in the medieval Novgorod dialect, e.g. NAsgn _vъxo_ (birchbark Novgorod 893), Gsgf _vъxoě_ (birchbark Novgorod 850), both twelfth century, and many similar examples (for which see Zaliznjak 2004: 46).
17. Pronoun *_sićь_, e.g. _sicь_ ‘such a one as this/here’, cf. also the derivation _sicevъ_ of the same meaning. Unmodified -_k_- is well-attested in SCr.

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[6] R _pol′za_ ‘use’ is unlikely to be authentic because palatalized *_g_ would probably yield soft _z′_ (cf. the soft _s′_ of _vsja_), so that we would have **_pol′zja_ (cf. Šaxmatov 1913: 41). Note that the abstract meaning by itself provides a strong indication that the word is not inherited.

[7] The stylistic value of R _stezja_ shows that the word does not belong to the inherited vocabulary.

18. Verbs with an aorist stem in *-a* (i.e. an inf in *-ati*), e.g. *klicati* ‘shout’, *-židzati* ‘kindle, ignite’. With one or two exceptions (notably **sьćati* ‘piss’), these verbs belong to productive patterns linking imperfectives to correlating perfective verbs. In OCS, modified velars are attested in the case of 17 verbal stems, in some of which they are clearly or arguably secondary (most glaringly pres1pl *navycajemъ* ‘learn’), and in some of which unmodified velars are attested too (e.g. *-striga-* ‘cut, shear’ alongside *-striza-*). In West Slavic, the number of verbs with modified velars does not exceed seven, but even there some secondary spread of the phenomenon has taken place. In East Slavic, modified velars do not occur at all, e.g. R *klikat′* ‘call’, *zažigat′* ‘kindle, ignite’.[8]
19. Msc *o*-stem nouns in PSl **-ędź-* continuing the borrowed Germanic suffix **-ing-*, e.g. *kъnędzь* ‘king, leader’. In the Slavic north, notably in R/BR, but also in Lechitic, the same suffix is common with unmodified *-g-*, e.g. *varjag* ‘Varangian’. Although it is conceivable that these examples may continue a local reflex along the same lines as *jaga*, it is also possible that they entered the language too late to participate in Prog.
20. A stem **gobьdź-* ‘plenty, prosperity’, borrowed from Germanic and reflected in such derivations as *ugobьdziti* ‘produce a plentiful harvest’. Outside OCS (Old Russian, Ukrainian, Czech) this example is only attested with the reflex of stem-final *-z-*, which is unusual.

This comes close to being a complete list of persuasive examples of Prog. In each case in which an unmodified velar is also attested this has been indicated.[9]

2.4. Restructuring of alternating paradigms caused by Prog

With a single exception (**pьćьlъ*, section 2.3, 14), the velar affected by Prog is root-final or even stem-final, hence an easy prey to analogical pressures. This is an important factor limiting the possibilities for fully understanding Prog, because one can rarely be sure that a modified – or unmodified – velar attested by a specific word form is phonetically regular or analogical.

A simple example is provided by verbs with an aorist stem in *-a* (section 2.3, 18), where the attested variation reflects the ease with which alternating aspectual pairs (**kliknǫti ~ klićati*) can become non-alternating (> **kliknǫti ~*

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[8] In Modern Standard Russian, derived imperfectives with Prog, though numerous, are always borrowings from Church Slavonic, e.g. *otricat′* ‘deny’, *vosklicat′* ‘exclaim’, *rasterzat′* ‘tear to pieces’ (cf., e.g., Bernštejn 1961: 210).

[9] For lists of positives attested in OCS see Van Wijk (1931: 67–68) and Diels (1932: 133–134). For Prog in verbs see particularly Jeżowa (1968: 52–181). For an inventory of doublets see Grickat-Virk (1951–52: 100–108), but a systematic search for instances of unmodified velars might bring to light hitherto unexpected facts. For some further discussion of the material, with references, see Vermeer (2008: 508–518, 545–548). Two words that have occasionally been adduced as examples of Prog do not belong on the list. In the case of the alleged adjective **tridźь* ‘three-year-old’, the available evidence actually points to **trizъ*. OCS *dręselъ* ‘sad’, rather than reflecting PSl **dręśelъ*, as has sometimes been assumed, is more likely a recent analogical formation without relevance to Prog. (On these words see further Vermeer 2008: 511, with references.)

klikati) on the basis of such examples as *zatъknǫti* ~ *zatykati* 'shut'. And vice versa, as in OCS *navycati* 'learn' or SCr *odsijecati* 'chop off', with **y* and **ě* preceding the modified velar, although those vowels do not trigger Prog.[10] As a consequence of this, it has so far proved impossible to exactly specify the set of verbs originally displaying the effects of Prog.

Similar shifts have take place *within* paradigms too. As we saw in section 2.2, velars followed by certain back vowels did not undergo Prog. Any credible formulation of the rule implies that Prog gave rise to alternating paradigms, e.g. Nsg **ędźa* (with palatalized velar) vs. Apl **ęgy* (with retained velar, on the assumption that *-y* blocked Prog, as is the general consensus). Since such alternating paradigms are nowhere attested in living material, not even in the earliest texts, it is obvious that they have everywhere been regularized. It is not always realized that the restructuring of the capricious paradigms generated by Prog is an important chapter of the morphological history of Common Slavic.[11]

Before looking at some of the details it makes sense to recall that for Slavic the second half of the first millennium was not exactly a time of linguistic business as usual. Not only phonology was changing all the time, but so was the inflectional system. If one wants to get some realistic idea of what nominal inflection was like at the time Reg2 & Prog took place, it does not do simply to project the situation as attested in OCS back to the sixth century CE, merely adjusting the phonological shapes of the endings. More was going on than that.[12]

This is expressed in the following diagram in two ways:

a) by the assumption that the original *o*-stem Nsg ending *-*o*/-*e* (< *-*os*) had not yet been replaced with *-*ъ*/-*ь*;
b) by the absence of reconstructed instrumental singular endings because it is difficult to tell when the inherited endings were replaced with the ones that are attested and which have an analogical origin.[13]

The diagram juxtaposes the *ā*-stem and msc *o*-stem paradigms as reconstructed for the stage immediately after Reg2 & Prog had taken place with the shapes attested in OCS. Note the way the uncertainty about the scope of the blocking rule (section 2.2) is expressed in the diagram.

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[10] See, e.g., Sobolevskij (1889: 32), Meillet (1902–05: 48), Zubatý (1910: 153–155), Belić (1921: 37–39).

[11] For tentative reconstructions of nominal paradigms as generated by Prog see, e.g., Zubatý (1910: 151), Mareš (1956: 467 = 1965: 40), Vermeer (2008: 527).

[12] See in this context Johannes Reinhart's overview of archaic features that dropped out of the tradition after the earliest OCS texts (Reinhart 2002). It shows how fast the language was evolving at the time and gives some idea of the abundance of features that may just have *failed* to make our earliest texts.

[13] Consistency would have required leaving the Gsg and Npl of the *ā*-stem paradigm open as well. The fact that I have not done so reflects the conviction that the analogical substitutions that gave rise to the attested endings, which were motivated by the loss of crucial distinctions following the elimination of word-final *-*s*-, were particularly rapid.

	after Prog		restructured	after Prog		restructured
Nsg	*ovьća*	=	*ovьća*	*otьće* < **otьko*	>	*otьćь*
Gsg	*ovьky*	>	*ovьćę̌*	*otьća*	=	*otьća*
Dsg	*ovьćě*	>	*ovьći*	*otьć/ku*	=/>	*otьću*
Asg	*ovьć/kǫ*	=/>	*ovьćǫ*	*otьkъ*	>	*otьćь*
Vsg	*ovьće*	=	*ovьće*	*otьče*	=	*otьče*
Isg	?	?	*ovьćejǫ*	?	?	*otьćemь*
Lsg	*ovьćě*	>	*ovьći*	*otьćě*	>	*otьći*
Npl	*ovьky*	>	*ovьćę̌*	*otьći*	=	*otьći*
Gpl	*ovьkъ*	>	*ovьćь*	*otьkъ*	>	*otьćь*
Dpl	*ovьćamъ*	=	*ovьćamъ*	*otьćemъ*	=	*otьćemъ*
Apl	*ovьky*	>	*ovьćę̌*	*otьky*	>	*otьćę̌*
Ipl	*ovьćami*	=	*ovьćami*	*otьky*	>	*otьći*
Lpl	*ovьćaxъ*	=	*ovьćaxъ*	*otьćěxъ*	>	*otьćixъ*
NAVdu	*ovьćě*	>	*ovьći*	*otьća*	=	*otьća*
GLdu	*ovьć/ku*	=/>	*ovьću*	*otьć/ku*	=/>	*otьću*
DIdu	*ovьćama*	=	*ovьćama*	*otьćema*	=	*otьćema*

The elimination of the inherited msc *o*-stem Nsg *-*o*/-*e*, which has nothing to do with Prog and may conceivably have been earlier, hence irrelevant, is taken into account here to avoid taking undue advantage of the possibility that the Nsg had an unmodified velar in stem-final position (***otьkъ*, originally limited to the Asg), a point that is important for what follows. Otherwise the differences between the two stages imply the following changes:

1. The inherited alternation of unmodified and palatalized velars was eliminated by generalizing the latter.
2. Case forms in which stem-final palatalized consonants were introduced in this way adopted the endings of the soft sub-paradigm (most commonly known as the *jo*- or *jā*-stem inflection). In some cases this was automatic, as is likely in the case of Asg/Gpl **otьćь* or Ipl **otьći*, in others it was not, notably in those case forms in which soft -*ę̌* was opposed to hard -*y*.
3. In endings beginning with or consisting of -*ě*, which were always preceded by palatalized velars, this vowel was replaced with -*i* in conformity with the soft sub-paradigm.[14]

What this shows is that the paradigms found in OCS and most of Slavic are the outcome of drastic restructuring involving not only the stem-final consonant, but also the system of endings.

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[14] On this ticklish issue Meillet (1900) and Zubatý (1910: 153) are still unsurpassed.

2.5. The possibility of analogical extension of the unmodified velar

Although generalization of palatals may seem obvious given their prominence in the paradigms involved, two points suggest that the odds in their favour were less overwhelming than they look at first sight.

First, unmodified velars occupied some pivotal positions, notably the Gsg, NApl, Gpl in the case of the *ā*-stems, and the Asg (> NAsg), Gpl, Apl in that of the msc *o*-stems.

Second, in quite a few case forms, palatals were followed by endings beginning in (or consisting of) *-ě* and *-i* reflecting **oi*. In that position velars did not occur. It follows that those palatals were compatible with the presence of velars elsewhere in the paradigm, as in such familiar examples as Asg **vьlkъ* 'wolf', Gsg **vьlka*, but Lsg **vьlćě*, Npl **vьlći*, Lpl *vьlćěxъ*, or Nsg **rǫka* 'hand', Gsg **rǫky*, but DLsg and NAVdu **rǫćě*. If case forms in which the paradigms of **vьlkъ* and **rǫka* have palatalized velars – by either Reg2 or the First Regressive Palatalization – are left out, our paradigms look as follows:

	singular	plural	dual	singular	plural	dual
N	*ovьća*	*ovьky*	–	*otьće*	–	*otьća*
G	*ovьky*	*ovьkъ*	*ovьć/ku*	*otьća*	*otьkъ*	*otьć/ku*
D	–	*ovьćamъ*	*ovьćama*	*otьć/ku*	*otьćemъ*	*otьćema*
A	*ovьć/kǫ*	*ovьky*	= N	*otьkъ*	*otьky*	= N
V	*ovьće*	= N	= N	–	= N	= N
I	?	*ovьćami*	= D	?	*otьky*	= D
L	–	*ovьćaxъ*	= G	–	–	= G

This suggests that there was a non-negligible chance for the unmodified velars to be analogically extended to all case forms in which they were phonotactically admissible, and that given slightly different initial conditions things might well have developed differently.

Scholars realized long ago – beginning, I think, with Zubatý (1910: 152) – that there are no absolutely clinching reasons preventing one from assuming that examples of the type P *jędza* and OCS *vьsь* generalized the palatal, and those of the type R *jaga* and Novg *vъxo* the unmodified velar. However, this insight is not enough to answer two important questions implicit in the material:

1. Why is it that restoration of the unmodified velar is well attested in all cases of stem-final *-g-* and *-x-*, but sporadic (outside verbs) in that of stem-final *-k-*?
2. What is it about R/BR that restoration of unmodified velar appears to center there?

2.6. Earlier explanations of the doublets

The existence of doublets of the type *jędza* vs. *jaga* has been known for a long time and explanations of several types have been proposed to account for them.

Some investigators have assumed that Prog operated irregularly or affected only part of Common Slavic. Shevelov, for instance, assumes that Prog took place as a regular phonological change in part of the Slavic linguistic territory only, after which lexical diffusion effaced the boundary between the two areas, or, to quote Shevelov's own words: "Thus it is obvious that the third palatalization [i.e. Prog, WV.] was not exactly a CS development. It was a vital process somewhere in SW, possibly spreading from there only partly as a phonetic change to the areas which were closer to the "epicenter" while to other, more remote areas it never spread as a live process but as the importation of single words affected by the third palatalization" (Shevelov 1964: 346).

Although Shevelov's scenario might easily have occurred, the trouble about it is that it does not explain why **g* and **x* are treated differently from **k*.

Others have tried to account for individual examples in terms of derivational analogy, hoping that the grand picture would take care of itself. Let us look at some examples.

In some cases, plausible explanations lie readily to hand. The noun **lьdźa* (4), for instance, is related to the adjective **lьgъ* or **lьgъkъ* 'light'. As long as the semantic connection with the adjective is maintained (as it is, say, in words with meanings like 'relief', e.g. Polish *ulga* or dialectal Russian *poľga*), analogical reintroduction of the unmodified velar would seem to be a natural change (cf. also Meillet 1934: 92).

Other cases present more difficulties. The unmodified velar of R *stega* has been explained as a recent back formation drawn from diminutives like R *stëžka* (Zierhoffer 1959: 17, Lunt 1981: 31–32). However, although such a change certainly looks plausible in itself, parallels are suspiciously few and marginal. I am not aware of a single example in the inherited Slavic lexicon of Russian. Of course, *fljaga* 'flask' (drawn from *fljažka*) is old and well established, but it is patently non-native. All other examples I have seen so far look like incidental formations produced for humorous effect, like R *mnogotiraga*, drawn from *mnogotirazhka* 'factory newspaper, house organ', which I have come across in work by the well-known St. Petersburg author Mixail Veller (b. 1948).[15]

Some nouns, for instance *jaga* or *vëx*, are even harder to explain along similar lines.

It needs no arguing that explanations in terms of the history of individual items are quite appropriate wherever they account best for the primary evidence. In the case of stem-final *-k-* they are in accordance with the incoherent geography of the primary evidence, for instance:

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[15] See <http://www.peoples.ru/art/literature/prose/detectiv/veller/history.html> or <http://www.ijc.ru/cen40.html> (both checked in March 2013).

- The pronoun *_sićь_ (section 2.3, 17) correlates with *_takъ_ ‘such, such a’ and several similar words (*_kakъ_, *_jakъ_, *_vьśakъ_), all of which have stem-final _-k-_, which can easily be reintroduced into *_sićь_. This appears actually to have happened in SCr, where continuations of *_sikъ_ are well attested, dialectally to this day.
- Instead of regular _-ьca_ (section 2.3, 2), suffixal *_-ьka_ occurs, beginning as early as the OCS Codex Suprasliensis (Asg _klětьkǫ/klětъkǫ_ ‘small room, hut’). This is generally explained by assuming that the alternant of the suffix containing unmodified _-k-_ was analogically transferred from words in which it was phonetically regular to words in which the alternant with *_-ć-_ was historically appropriate. Most – perhaps all – cases of unexpected _-k-_ instead of *_-ć-_ in nouns permit explanations along similar lines.[16]

In the case of _-g-_ and _-x-_, however, the trouble about efforts to account for the evidence in terms of individual items is that it leaves part of the material unexplained (_jaga_, _vëx_) and fails to account for the geographical pattern.

3. Early Russian/Belorussian phonology and the generalization of unmodified _-g-_ and _-x-_

According to the view to be presented here, the reason why R/BR displays unmodified _-g-_ and _-x-_ in nominal paradigms has phonological roots. Therefore we need to take a closer look at the consonant system, beginning with the stage at which Reg2 & Prog took place.

3.1. The phonological consequences of Reg2 & Prog: a series of new consonants

Uncontroversially, by Reg2 & Prog the three velar obstruents *_k_, *_g_, and *_x_ spawned a novel series of palatal consonants distinct from preexisting *_č_, *_ž_, and *_š_, which had arisen earlier by the First Regressive Palatalization of velars (henceforth “Reg1”).

It is traditional to assume that the new consonants originated in the usual humble fashion as palatalized allophones of *_k_, *_g_, and *_x_ in certain palatal contexts, more specifically: before front vowels that had recently appeared as reflexes of monophthongized *_oi_ (Reg2), and in the context that triggered Prog.

Moving on to the next phase of their career, the palatalized allophones became contrastive phonemes as a consequence of the changes that rendered the environment for Prog opaque (see section 2.2(4)) and which caused the velar obstruents *_k_, *_g_, *_x_ and their former palatalized allophones to be contrastively opposed to each other before *_a_ and probably also before *_u_ and/or *_ǫ_, e.g. Gsg *_-nika_ (< *_-neikā_) vs. Nsgf *_nića_ (< *_nīkā_) or Gsg/NApl *_ьga_ ‘yoke’ (< *_jugā_) vs. Nsg _stьdźa_ (< *_stigā_).

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[16] For an example see Kreja (1996).

During the stage immediately following Reg2 & Prog, velars did not occur before front vowels in inherited material. If OCS is anything to go by, the gap was eventually filled by loans.

The attested continuations of the reflex of **k* as modified by Reg2 & Prog leave no doubt that it was – or at some Common Slavic stage became – a [tś]-like affricate. Similarly the reflexes of palatalized **g* – principally *dz*, *ź*, and *z* – show pretty conclusively that it was the voiced counterpart of **ć*, i.e. [dź]-like, as indeed one would expect on general grounds. It is clear from this that at some stage palatalized **k* and **g* changed into affricates in all of Slavic. The question whether this happened before or after the palatalized consonants became contrastive segments – or perhaps simultaneously – is immaterial from the point of view of the present contribution.

As for palatalized **x*, it is nearly always found merged with reflexes of either **š* (< **x* by Reg1) or **s*, hence it is likely to have been a [ś]-like fricative situated phonetically midway between the two.

3.2. Two structural redundancies: the initial element of **dź* and the palatality of **ć* and **dź*

Nowhere in Slavic have the new palatalized obstruents been retained as such. This suggests that they were vulnerable. A closer look at the system as it was just after the new consonants had arisen brings to light several factors calling for structural adjustments, two of which are important from the point of view of the present contribution.

The first has to do with the initial element of **dź*, which was redundant, hence expendable, because the system contained no ***ź*, so that loss of the stop did not threaten the independence of the unit. It is not strange that nearly everywhere in Slavic it had been eliminated by the time of the earliest records.

A second redundancy had to do with the position of the new consonants in the system.

The new series existed alongside the older palatal series, which owed its rise to Reg1 (**č*, **ž*, **š*).[17] Although both series were palatal, they were contrastively opposed to one another, as is shown eloquently by the fact that their attested reflexes are nearly everywhere different. Nevertheless it is reasonable to expect that in origin they were perceptually similar, say more or less along the lines of modern Serbo-Croatian /ć/ and /č/, which, as is well known, tend to merge at the slightest provocation. Accordingly, they *might* easily have fallen together in a single palatal series. Normally, however, what has happened is that the entire **ć* series has lost its palatality, resulting in **ś* merging with preexisting **s* and, in addition, **dź* merging with **z* in those areas where its initial element was eliminated.

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[17] It goes without saying that there are also the reflexes of **tj* and **dj* to be considered in this context. Although there is no absolute consensus about the best way to reconstruct the development of these sequences, many investigators – possibly a majority – accept Fortunatov's assumption (1888: 568) that they were geminates for a considerable time, primarily because that provides a suitable starting-point for the peculiar reflexes found in the Bulgarian/Macedonian dialect area (see, e.g., Šaxmatov 1896: 698, 1915: 37–38, Lehr-Spławiński 1921–22: 29n., Ramovš 1924: 257–261, Trubetzkoy 1930: 389, Vaillant 1950: 62–63, 66–67, Shevelov 1964: 215, Kortlandt 1982: 184–186). The vowel lengthening rule known as "Van Wijk's law" suggests that the geminates were simplified only after the uncoupling of the old length contrast, hence significantly later than Reg2 & Prog (see on this notably Kortlandt 1982: 186).

There are several exceptions to this, best known among them the familiar merger of **ś* with **š* found in all of West Slavic (and apparently also in some adjacent areas of East Slavic), and the merger of **ć* with **č* found in some varieties of Russian and which is usually referred to as *cokan'e*.

If one examines what the consonant system was like just after the new series had arisen, it turns out that the palatality of **ć* and **dź* was redundant because the system lacked non-palatal ***c* and ***dz*. Accordingly **ć* and **dź* eventually lost their palatality in most Slavic dialects, dragging **ś*, the palatality of which happened not to be redundant (because it served to distinguish **ś* from preexisting **s*), with them.

In what follows, the loss of the first element of **dź* will be referred to as the Spirantization of **dź* or "Spir", and the loss of palatality of the **ć* series as the Depalatalization of the **ć* series or "Depal".

3.3. The relationship between Spir and Depal

The Spirantization of **dź* and the Depalatalization of the **ć* series are not completely independent of one another.

Wherever Depal precedes Spir, the former deprives the latter of its structural motivation because it causes **dź* to yield **dz* and find itself opposed to **z* by the mere presence of the initial element **d*, which now is no longer expendable.

Conversely, wherever Spir precedes Depal one would expect it to diminish *its* internal motivation somewhat because it causes **dź* to yield **ź* and to be opposed to *z* merely by the presence of the palatal feature, which now is no longer redundant. However, this by no means eliminates the structural reason favouring Depal because in the case of **ć*, which is likely to have been by far the most frequent member of the series, palatality is still redundant, hence prone to be neglected and lost, risking to drag **dź* and **ś* with it.[18]

These insights can be used to explain the geographical distribution of the reflexes of **dź*. As is well known, the initial component of **dź* has been retained in two dialect areas, both peripheral. Those are Lechitic in the northwest, and the margins of the Bulgarian-Macedonian area in the extreme south, as attested most clearly and authoritatively in part of the OCS tradition. This suggests that Depal had been carried out in those areas before Spir arrived there. And once systems had undergone Depal, Spir was no longer internally motivated and didn't take place.

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[18] This is an example of what seems to be a common type of occurrence, by which a change that is well-motivated and innocuous in the case of one member of a series leads to the loss of the phonological independence of other members.

Note that it is unlikely that it was merely the marginal position of Lechitic and the Bulgarian-Macedonian periphery that caused them to develop differently from the remainder of Slavic, because during the period involved, both dialect areas were carrying through one Common Slavic innovation after the other, showing the presence of social and sociolinguistic factors favouring joint linguistic developments. Therefore it is preferable to have a specific mechanism explaining why the initial element of *_dź_ remained in place in those areas.[19]

In the remainder of Slavic, Spir was earlier than Depal, to the extent that the latter took place at all. Accordingly, the view of early East Slavic phonology developed in this contribution starts from a *_ć_ series consisting of *_ć_, *_ź_, and *_ś_, with *_ź_ (< *_dź_) now no longer being the voiced counterpart of *_ć_, but that of *_ś_.[20]

3.4. Consonant-vowel sequences beginning with members of the *_ć_ series

Before looking at further changes the system underwent in R/BR, it is important to have some idea of the consonant-vowel sequences in which members of the *_ć_ series occurred.

As a consequence of Reg2 and in positions combining the contexts for Reg2 and Prog, sequences existed consisting of a member of the *_ć_ series and one of the front vowels *_i_ or *_ě_ reflecting earlier *_oi_, e.g. Npl *_učenići_, *_otьći_, imp2sg *_rьći_, DLsg/NVAdu *_rǫćě_, Lpl *_otьćěxъ_, imp2pl *_rьćěte_. Recall that those vowels were never preceded by velars (section 3.1).

In native material, all other existing consonant-vowel sequences beginning with a member of the *_ć_ series owed their existence to Prog. They were:

1. Sequences with the front vowel *_e_ reflecting earlier *_o_ automatically umlauted after palatal consonants, e.g. Dpl *_otьćemъ_ ‘father’, Vsg *_děviće_ ‘maiden’ (dim.), reflecting pre-Prog *_otьkomъ_, *_děviko_.
2. Sequences with *_a_, e.g. Gsg/NVAdu *_otьća_, Nsg *_děvića_.
3. Sequences with *_u_ and/or *_ǫ_, unless those vowels blocked Prog (see section 2.2), e.g. Dsg/GLdu *_otьću_, Asg *_dévićǫ_.

Quite a few vowels did not occur at all after members of the *_ć_ series:

- *_ь_ or *_ę̌_ because no phonetic source giving rise to them existed; later these vowels came to occur after members of the *_ć_ series as a consequence of the morphological restructuring of the Prog paradigms discussed in section 2.4, when such forms as Asg *_otьćь_, Apl *_otьćę̌_, Gpl *_děvićь_, Gsg/NApl *_děvićę̌_ were substituted for the phonologically regular forms *_otьkъ_, *_otьky_, *_děvikъ_, *_děviky_;

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[19] For the type of reasoning see Trubetzkoy (1930: 389).

[20] Note that in those West Slavic areas where Spir took place (Sorbian, Czech, Slovak), the reflex of *_ź_ < *_dź_ has not merged with *_ž_. This shows that at the stage that saw the West Slavic merger of *_ś_ with *_š_ taking place, Spir had not yet hit the area. This important insight is not often expressed explicitly, but it is at least as old as Šaxmatov (1915: 40), probably older.

- *_ъ_, *_o_, or *_y_ because those vowels did not occur after palatal consonants and were automatically replaced with *_ь_, *_e_, and *_i_ (see Meillet 1900: 9 and many later investigators);
- *_u_ and/or *_ǫ_ in case those vowels – or one of them – blocked Prog.

3.5. The rise of allophonic palatalization in the Russian/Belorussian area

As is almost too well known to even bear mentioning, the attested Slavic dialects of R/BR have what is known as a palatalization correlation, or had so for some time.

By common consent, such systems reflect an earlier situation in which consonants were non-contrastively (allophonically) palatalized by following front vowels, after which palatalization became contrastive as a consequence of changes in the vowel system that are basically well understood, for instance loss of nasality in *_ę_, merger and loss of the weak jers, and retraction of *_e_ (> _o_) in certain palatal environments in most areas.[21]

What is important from the point of view of the present contribution is only the first stage of this important development, in other words: the rise of a rule non-contrastively palatalizing any consonant followed by a front vowel.

As allophonic palatalization before front vowels took root in R/BR, one expects that speakers started to experience difficulties telling apart palatalized /ś/-/ź/ and plain /s/-/z/ preceding front vowels because in that position plain /s/ and /z/ were realized increasingly with palatalization. Examples of pairs of sequences that now threatened to fall together:

- *_śě_ ~ *_sě_, e.g. *_śědъ_ ‘grey-haired’, GLpl *_vьśěxъ_ ‘all’, DLsg *_strěśě_ ‘roof’, vs. *_sějati_ ‘sow’, Lpl *_pьsěxъ_ ‘dog’, DLsg *_kosě_ ‘scythe’;
- *_źě_ ~ *_zě_, e.g. DLsg *_stьźě_ ‘path’, *_noźě_ ‘foot’, Lpl _roźěxъ_ ‘horn’, vs. DLsg *_kozě_ ‘goat’, Lpl *_vozěxъ_ ‘cart’;
- *_śe_ ~ *_se_, e.g. NAsgneu *_vьśe_ ‘all’ vs. aor2/3dg *_nese_ ‘carry’;
- *_źe_ ~ *_ze_, e.g. Dpl *_robotęźemъ_ ‘slave’, vs. pres1pl *_vezemъ_ ‘convey’;
- *_śi_ ~ *_si_, e.g. Nplmsc *_vьśi_ ‘all’ vs. Npl *_pьsi_ ‘dog’;
- *_źi_ ~ *_zi_, e.g. Npl *_robotęźi_ ‘slave’, imp2sg *_pomoźi_ ‘help’ vs. Npl *_vęzi_ ‘elm-tree’, imp2sg _vezi_ ‘convey’.

Given the circumstances, it is reasonable to expect that as time went on the contrast became difficult to maintain and that eventually the two pairs merged before front vowels, with the product of the – local – merger being realized redundantly palatal: [ś]/[ź].[22]

The merger had dramatic consequences for the status and functional load of /ś/ and /ź/.

To begin with, it was now only in the sequences *_śa_ and *_źa_ that they were still contrastively opposed to *_s_ and *_z_, and probably also in the sequences *_śǫ_, *_śu_, *_źǫ_, and *_źu_.

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[21] See Van Wijk (1937–1938) and many similar publications.

[22] Similarly, one expects that *_n_, *_l_, and *_r_ merged with *_ń_, *_ļ_, and *_ŕ_ before front vowels at this stage.

Even more importantly, sequences beginning with **ś* or **ź* were limited to words that had undergone Prog. Such words cannot have been numerous, comprising as they did a mere handful of nouns, the pronoun **vьśь*, and a few verbs in *-ati*. Although exact numbers cannot be given, /ś/ is unlikely to have occurred in more than four or five lexemes and /ź/ at most in about a dozen. Both consonants always alternated with /x/ and /g/. The sequence **źa* was limited to:

1. the Nsg, the oblique cases of the plural, and the DIdu of **ęźa*, *-*lьźa*, and **stьźa*;
2. the Gsg and NVAdu (and possibly the Isg), of a small number of msc nouns (Gsg **orbotęźa*) including possible members of the type **kъnędźь* (say Gsg **kъnęźa*);
3. a few verbs with an aorist stem in *-a-*, e.g. **pomiźati* 'wink'.

The sequence **śa* must have been constantly on everybody's lips in the pronominal Nsgf and NApln **vьśa*, and no doubt in the derivation **vьśakъ*, but otherwise of very limited occurrence; the only examples I can think of are the Nsg and various other forms of **elьśa*, the Gsg and NAVdu of the phytonym **vьśь* (**vьśa*), and the rare verbs in *-ati* with a stem in *-*x*-, e.g. aor2/3sg **pьśa* 'pound'.[23]

Unless *u* and/or *ǫ* blocked Prog there is also the following to reckon with:

- **źǫ* was limited to the Asg of the *ā*-stem nouns (**stьźǫ*) and possibly one or two verbal forms if they happened to offer the right context (perhaps pres 1sg **striźǫ*, 3pl **striźǫtь*);
- **źu* occurred in the Dsg and the GLdu of a small number of nouns (**orbotęźu*, **stьźu*);
- **śǫ* must have been common in the pronominal Asgf **vьśǫ*, but otherwise rare, e.g. Asg **elьśǫ*, pres1sg **pьśǫ*, 3pl **pьśǫtъ*;
- in the case of **śu* I would be hard put to mention examples apart from GLdu **elьśu* and Dsg and GLdu **vьśu* (the phytonym), forms unlikely to crop up very often in ordinary speech.

3.6. Nominal paradigms in etymological *-g-* and *-x-*

This is the right moment to take a closer look at the structure of nominal paradigms in which stem-final *-g-* or *-x-* alternated with the reflexes of Reg2 & Prog. There were two of those, one in nouns in which Reg2 had taken place, another in nouns that in addition displayed the effects of Prog. The phonological shape shown here is the one that obtained after the distinction between /ś/-/ź/ and /s/-/z/ had been eliminated before front vowels. The archiphonemes are written as *s* and *z*, not only in order to differentiate them visually from those cases where the palatal character of [ś] and [ź] is contrastive, but also because that way is phonologically more realistic.

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[23] In **pьśati* all of Slavic eventually generalized stem-final *-x-*, no doubt to avoid the awkwardness caused by the phonetic closeness to the verb meaning 'write, paint' (**pьsati*). See also Vermeer (2008: 559).

	msc Prog		msc Reg2	fem Prog		fem Reg2
Nsg	*robotęze*	≠	*rogo*	*stьźa*	≠	*noga*
Gsg	*robotęźa*	≠	*roga*	*stьgy*	=	*nogy*
Dsg	*robotęź/gu*	≠?	*rogu*	*stьzě*	=	*nozě*
Asg	*robotęgъ*	=	*rogъ*	*stьź/gǫ*	≠?	*nogǫ*
Vsg	*robotęže*	=	*rože*	*stьze*	≠	*nogo*
Isg	?	?	?	?	?	?
Lsg	*robotęzě*	=	*rozě*	*stьzě*	=	*nozě*
Npl	*robotęzi*	=	*rozi*	*stьgy*	=	*nogy*
Gpl	*robotęgъ*	=	*rogъ*	*stьgъ*	=	*nogъ*
Dpl	*robotęzemъ*	≠	*rogomъ*	*stьźamъ*	≠	*nogamъ*
Apl	*robotęgy*	=	*rogy*	*stьgy*	=	*nogy*
Ipl	*robotęgy*	=	*rogy*	*stьźami*	≠	*nogami*
Lpl	*robotęzěxъ*	=	*rozěxъ*	*stьźaxъ*	≠	*nogaxъ*
NAVdu	*robotęźa*	≠	*roga*	*stьzě*	=	*nozě*
GLdu	*robotęź/gu*	≠?	*rogu*	*stьź/gu*	≠	*nogu*
DIdu	*robotęzema*	≠	*rogoma*	*stьźama*	≠	*nogama*

The important point to keep in mind here is the following. After the contrast between /ś/-/ź/ and /s/-/z/ had been lost before front vowels, the system of alternations inherited by the Prog paradigms (**robotęze* ~ **stьźa*) differed from the one found in more central dialects of Slavic in a way that rendered generalization of the modified velar a less obvious change than it was elsewhere. For generalization of the modified velars to take place, speakers had to identify positionally palatalized [ź] and [ś] with contrastively palatalized /ź/ and /ś/. In other words, they had to realize that the modified consonant in such forms as Lsg *robotęzě* or DLsg *stьzě* was underlyingly identical with **ź*. This cannot have been easy because examples were rare and all other instances of [ź] and [ś] were just positional allophones of /z/ and /s/. For that reason, speakers were bound at some point to miss the connection with **ś*/*ź* and jump for **s*/*z*. Though understandable from their point of view, indeed inevitable, this effectively destroyed the morphophonological unity of the palatalized velars.

Given the presence of factors working against generalization of the modified velars, the most obvious way of regularizing the Prog paradigms was by making them conform to the Reg2 paradigms, which were similar already in that they, too, had stem-final -*g*- and -*x*- alternating with [ź] and [ś], i.e. *s* and *z*, before endings beginning in a front vowel, moreover, largely the same endings in both paradigms.[24]

Reg2 paradigms were in two ways simpler than Prog paradigms:

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[24] As we have seen, nouns with stem-final -*g*- or -*x*- and Prog paradigms were few and far between. And although, quite obviously, nouns with stem-final -*g*- or -*x*- and non-Prog paradigms cannot have been particularly numerous either, they *were* more numerous and comprised such presumably common words as **rogъ* 'horn', **sněgъ* 'snow', **bergъ* 'riverbank, hill', **porgъ* 'threshold', **porxъ* 'dust', **straxъ* 'fear', **měxъ* 'pelt, fur, sack, etc.', **noga* 'leg, foot', **sluga* 'servant', **muxa* 'fly', **strěxa* 'roof', not to speak of such adjectives as **mъnogъ* 'much' and **suxъ* 'dry'.

1. They did not have a small number of case forms with stem-final *-ź-* or *-ś-* appearing seemingly out of the blue.
2. They did not have endings capriciously beginning in *-e-* corresponding to *-o-* in the hard inflectional subtype. As it happened, the number of such endings was tiny, which is bound to have made their position even more precarious: in the msc *o*-stem paradigm they were the Nsg – if it still existed – and the Dpl, in the *ā*-stem paradigm only the Vsg.

It follows that by restructuring the Prog paradigms on the example of the Reg2 model the language stood to eliminate a whole range of anomalies. Two changes were needed for it to happen:

- analogically replacing *-ź-*/*-ś-* with *-g-*/*-x-*;
- eliminating forms with *-ze-* or *-se-* corresponding to *-go-* or *-xo-*.

And that is what I assume happened. The stem-final *-g-* of *jaga* and similar words owes its existence to the restructuring of Prog paradigms that took place everywhere in Slavic, but that led to generalization of the unmodified velar in R/BR in the case of nouns in stem-final *-g-* and *-x-* because local phonology rendered generalization of the modified consonant less obvious than it was elsewhere.

The reflex of **ć* differed fundamentally from that of **dź* and **ś* in that it remained uniquely determinable even after the rise of positional palatalization by following front vowels. Assuming, for argument's sake, that palatalization in examples like DLsg **ovьćě* was now automatic, the absence of non-palatal ***c* resulted in speakers still being in a position to identify the stem-final consonant with that in, say, Nsg **ovьća* (where it was not automatic) in a way they were not in the case of DLsg **stьzě* and **stьźa*. Since, therefore, in the case of stem-final *-ć-*, conditions were no different from what they were elsewhere in Slavic, one expects that further developments were the same, too. Hence it is not surprising that generalization of **ć* in Prog paradigms is found in R/BR in the same way as elsewhere.

3.7. The pronoun 'all'

The case of the pronoun 'all', though superficially similar to that of the nouns, was different in fundamental respects. Its paradigm was as follows (I leave the dual out, but include the Isg, about which there are no reasons to be diffident in the case of a pronoun):

	msc	msc+neut	neut	all genders	fem
Nsg	*vьse*		*vьse*		*vьśa*
Gsg		*vьsego*			*vьseję̌*
Dsg		*vьsemu*			*vьsei*
Asg	*vьxъ*		*vьse*		*vьś/xǫ*
Isg		*vьsěmь*			*vьsejǫ*
Lsg		*vьsemь*			*vьsei*
Npl	*vьsi*		*vьśa*		*vьxy*
Gpl				*vьsěxъ*	
Dpl				*vьsěmъ*	
Apl	*vьxy*		*vьśa*		*vьxy*
Ipl				*vьsěmi*	
Lpl				*vьsěxъ*	

This paradigm differed in important ways from the nominal paradigms discussed in the previous section:

1. Differently from the nouns, there was no closely parallel Reg2 paradigm to which the pronoun could readily adapt, the way **robotęze* and **stьźa* could adapt to **rogo* and **noga*, simply because there were no other pronouns with stems in -*x*- (or -*g*-).
2. Case forms with stem-final -*ś*- were few because only three pronominal endings began in -*a* (Nsg fem, NApl neu, NAdu msc), one in -*ǫ* (Asg fem) and none in -*u*. Case forms with unmodified -*x*- were few too, but pivotal and likely to have been frequent (Asg msc and Apl msc, NApl fem). Case forms with -*s*- were however predominant, and may have served as the starting-point for extension of -*s*- to forms with -*x*-.
3. Case forms with soft -*e*- (corresponding to hard -*o*-), while exceptional in the nouns, were very numerous, concentrating in the singular.

Given the structure of the paradigm, generalization of stem-final -*s*- to forms that originally had -*x*- seems natural, probably beginning in the singular, where the only case form with -*x*- is the Asg (or NAsg) msc, and perhaps the Asg fem. In the case of the former we are not in a position to tell whether the speakers jumped for underlying -*s*- and added the soft ending -*ь* because so many singular forms already had soft endings, or selected -*ś*-, after which -*ь* was automatic > -*sь*. Anyhow, from that stage onwards elimination of -*x*- in the msc Apl and NApl fem, with substitution of the soft ending *-*ę̌*, was natural. As for the Asg fem ending, if a substitution needed to be carried out at all, it is obvious the speakers took stem-final -*ś*- from the Nsg fem.

4. Notes on the wider context

The reconstruction that was presented in the preceding section raises some problems having to do with neighbouring dialects and languages.

4.1. Lechitic versus Russian-Belorussian

As is well known, Lechitic is like R/BR in reflecting a system in which at some stage consonants were palatalized by following front vowels. Assuming that P *jędza* and Old Polish *stdza* (< **stьdźa*) are representative of local developments, one wonders why the Prog paradigms did not evolve there in the way they did in R/BR.

A closer look at the consonant system brings to light two important differences. Since **dź* never lost its initial occlusive element in Lechitic (see section 3.3), it remained uniquely identifiable, just like **ć*, even if early palatalization of consonants by following front vowels was carried through the way it was in R/BR, as is likely. And since Lechitic is West Slavic, it participated in the early merger of **ś* with **š* (see section 3.2). As a consequence, the structure of the Lechitic paradigms was different in such a way that there was no basis for the developments that led to the generalization of stem-final *-g-* and *-x-* in R/BR.

A striking detail found in all of Lechitic is the presence of an unmodified velar in the local continuations of **-lьdźa* (e.g. *ulga*). It is likely that this reflects the well-known fact that unsuffixed **lьgъ* 'light' survived in Lechitic much longer than elsewhere in Slavic – it still survives dialectally – and was available as a model for analogical reintroduction of unmodified *-g-* that was more transparent than suffixed **lьgъkъ* (see further section 2.6).

4.2. A hypothesis as to the underlying cause of the rise of allophonic palatality

It is a familiar fact that in Lithuanian, consonants are obligatorily palatalized when followed by front vowels. If that was the case also in the Baltic dialects that were submerged by Slavic in the present-day Belorussian area, chances are that subphonemic palatalization of consonants followed by front vowels was a feature of Slavic as spoken by first generation ex-Baltic speakers there and that that is the ultimate source of the palatalization correlation that developed later in most of East Slavic.[25]

There are several indications pointing to linguistic contact between Slavs and northern non-Slavs as early as the period that saw Reg2 & Prog taking place, notably:

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[25] Although I have not come across this idea in the literature I have seen, it is so obvious that I assume that it is not new and that I simply have not looked in the right places.

1. It is generally accepted that the hydronym *Luga* continues the first element of the Finnic compound *Laukaanjoki* (Mikkola 1906: 10, accepted by Kalima 1915: 59 and most later investigators). This would seem to imply that the diphthong **ou* had not yet been monophthongized at the time the name passed into Slavic.
2. As we saw earlier, the variety of Slavic spoken in the Novgorod-Pskov area originally stood out from all other Slavic dialects in not displaying the effects of Reg2 (section 2.2(2)). This suggests that the monophthongization of diphthongs took place there after the palatalization rather than before, as elsewhere, so that modified velars occur only in words in which Prog took place.[26]
3. Latvian-Slavic and Finnic-Slavic loans indicate contact in the period postdating the monophthongization of diphthongs, but preceding the raising of monophthongized **ei* and **ou* to *i* and *u*.[27]

It would seem to follow that one is entitled to operate with the possibility of Baltic-Slavic and Finnic-Slavic substratum effects beginning at the latest around the stage at which Reg2 & Prog and the monophthongization of diphthongs took place. However, chances are that there was a lengthy period of ongoing assimilation during which new first-generation ex-Baltic speakers of Slavic appeared, and made their influence felt, all the time.

If palatalization of consonants followed by front vowels did originate in Baltic, it obviously moved beyond its area of origin. Given the way Slavic was interconnected during most of the second half of the first millennium, and carrying out joint innovations accordingly, that is more or less what one would expect. Nevertheless it may not be accidental that the presence of systems with a genuine palatalization correlation coincides fairly closely with the presence of Baltic speakers in the past.

4.3. The extreme north: Novgorod-Pskov

As was noted above (section 2.2(2)), the variety of Slavic that arose in the Novgorod-Pskov area originally did not display the effects of Reg2. This had important consequences for the position of the members of the **ć* series in the dialect:

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[26] See Vermeer (1986: 508, 2000: 17–22). All other explanations I am aware of assume that the palatalization process itself took a different course in Novgorod/Pskov from the one found elsewhere (e.g. Krys'ko 1994: 32, Andersen 1998: 590–593). In view of the early date of both Reg2 & Prog and the monophthongization of diphthongs, and in view of the the numerous innovations Novgorod/Pskov subsequently shared with its neighbours, I prefer an explanation by which the specific position of Novgorod/Pskov is fully accounted for in terms of Common Slavic processes.

[27] For discussion and references see Vermeer (2008: 550–553).

1. They never occurred in word-initial position.
2. Borrowings apart, they were limited to words in which Prog had taken place, where they always alternated with velars.
3. Alternations involving them were the only cases of alternation involving the final stem consonants of nouns, with the sole exception of the msc Vsg of nouns with stems in velar consonants, where velars alternated with the outcome of Reg1.[28]

It follows that in Novgorod/Pskov Slavic the Prog paradigms, in addition to being complex and seemingly capricious, were utterly anomalous from the point of view of the system as a whole. Hence one expects that the need to eliminate them was even more pressing than elsewhere and made itself felt right from day one. The only question was: what to generalize?

Long ago I proposed the hypothesis that the marginal position of **dź* and **ś* tipped the scales in favour of general restoration of the unmodified velar (Vermeer 1986). Although I think it is the best explanation available at present, I would like to refine it here by the suggestion that Spir took place first: **dź* > **ź* (see section 3.3). After that had happened, **ś* and **ź* constituted a pair of palatalized sibilants squeezed in uncomfortably between **s/z* and **š/ž*. The most obvious way to avoid having to produce these sounds was by substituting unmodified velars for **ś* and **ź* in the mere dozen of items in which they occurred and in which part of the case forms already displayed unmodified *-x-* or *-g-* in stem-final position.

On the other hand, since **ć* was less vulnerable phonologically because it was not contrastively opposed to non-palatal ***c*, in addition to being much more frequent, it was generalized in the ordinary pan-Slavic fashion, only to merge with **č* before Depal had taken effect, producing *cokan′e* (section 3.2). If any examples of **ś* and **ź* survived at this stage, which may have been the case in borrowings, one expects that they merged with **š* and **ž*.[29]

4.4. A suggestion on Old Novgorod Dsg *kъnjazu*

Andrej Zaliznjak has drawn attention to the existence of at least five 12th-century examples of Dsg *kъnjazu*, with *-u*, instead of regular *kъnjazju* (Zaliznjak 2004: 46–47). What is odd here is that parallel examples with similar departures from orthographic normalcy (say Gsg ***kъnjaza* or Dpl ***kъnjazomъ*) appear to be extremely rare, to the extent that they occur at all.

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[28] Note that we are not in a position to tell for how long the original msc *o*-stem Vsg **-e*, and with it the accompanying alternation involving stem-final velars, survived. In the Novgorod-Pskov dialect as historically attested, the Vsg is identical to the Nsg in this inflection. Examples with retained velars are attested at least from the final years of the eleventh century onwards. The textbook example is *arxistratige* ‘general, commander’ (Karněeva 1916: 126, with a footnote by Durnovo giving further examples), which is all the more telling for being a Church Slavonic borrowing.

[29] See further Vermeer (1986), corrected and updated in Vermeer (2000: 18–20).

I would like to offer the suggestion that these examples are in fact natural in varieties of Russian that eliminated **ź* reflecting **dź*. Whereas subsequently /z’a/ was reintroduced from **zę*, and /z’o/ from **ze*, etcetera, there was no way for **/z’u/ (i.e. soft /z’/ followed by /u/) to arise in a similar way because there was no source. For that reason what one expects is the existence at some stage of speakers of northern Russian who were able to say Gsg *kъnjazja* (/kъn’az’a/) and Dpl *kъnjazemъ* (/kъn’az’omъ/), but were forced to substitute *kъnjazu* for **kъnjazju* because they lacked the sequence **/z’u/.

It is much less likely that speakers unable to say **kъnjazju* existed more to the south because there a voiceless counterpart of /z’u/ occurred in the frequent pronominal form Asg **vьsju* (/vьs’u/ or /vъs’u), for which see section 3.7.

4.5. Novgorod/Pskov and mainstream Russian/Belorussian

There is no question but that Novgorod/Pskov started out as a remarkably aberrant Slavic dialect. Not only did it somehow manage to evade Reg2, but it also failed to generalize the msc *o*-stem Asg to the Nsg, developing the unique Nsg ending *-e* instead. But contact with the rest of the Slavic world was always maintained, as is shown by joint innovations too numerous and basic to list. Since mainstream R/BR provided Novgorod/Pskov’s only link with outside Slavdom, this implies the existence of close linguistic contacts between carriers of the two dialects. It follows that one can rarely be sure that a feature found in both dialect areas is autochthonous rather than imported from the neighbouring area.

To give an example, it is likely that the Prog paradigms were regularized in Novgorod/Pskov almost immediately after they had arisen because they were unlike anything else in the system (section 4.3). In dialects that had carried out Reg2 they were decidedly less anomalous. It follows that generalization of the unmodified velars in the nominal declensions in R/BR, though understandable as an internal development (see section 3.6), may well have been encouraged by contact with northern speakers in whose language the change had been carried out already. In the case of the pronoun **vьśь/vьxъ*, on the other hand, the northern solution was less attractive to southern speakers because generalization of the unmodified velar was not a very obvious change given the facts of their dialect (section 3.7).

Along similar lines, generalization of unmodified velars in verbs, which is a natural innovation in just about any system (section 2.4), may well have started in Novgorod/Pskov as it was eliminating all instances of alternating **ź* and **ś*, after which elimination of the alternation in the case of **ć* was trivial.

5. Conclusions

In the present contribution, I have argued for the following chronology for R/BR (except Pskov/Novgorod):

1. Reg2 & Prog give rise to _*ć_, _*dź_, _*ś_ (section 3.1).
2. Spir: the initial element of _*dź_, being redundant, is lost (> _*ź_) (sections 3.2–3).
3. At some fairly early stage (possibly even before Reg2 & Prog), the variety of Slavic spoken in the Russian-Belorussian area adopts a rule by which any consonant is automatically palatalized before front vowels (section 3.5). Chances are that the rule originated in the Baltic substratum that was in the process of being submerged by Slavic (section 4.2).
4. As a consequence, _*s_ and _*z_ merge with _*ś_ and _*ź_ before front vowels (section 3.5).
5. In the case of _*ś_ and _*ź_, the merger of _*s_ and _*z_ with _*ś_ and _*ź_ before front vowels renders generalization of the modified velar in nominal paradigms a less obvious way of regularizing the Prog paradigms than it was elsewhere; accordingly they adapted to the Reg2 paradigms instead (section 3.6).

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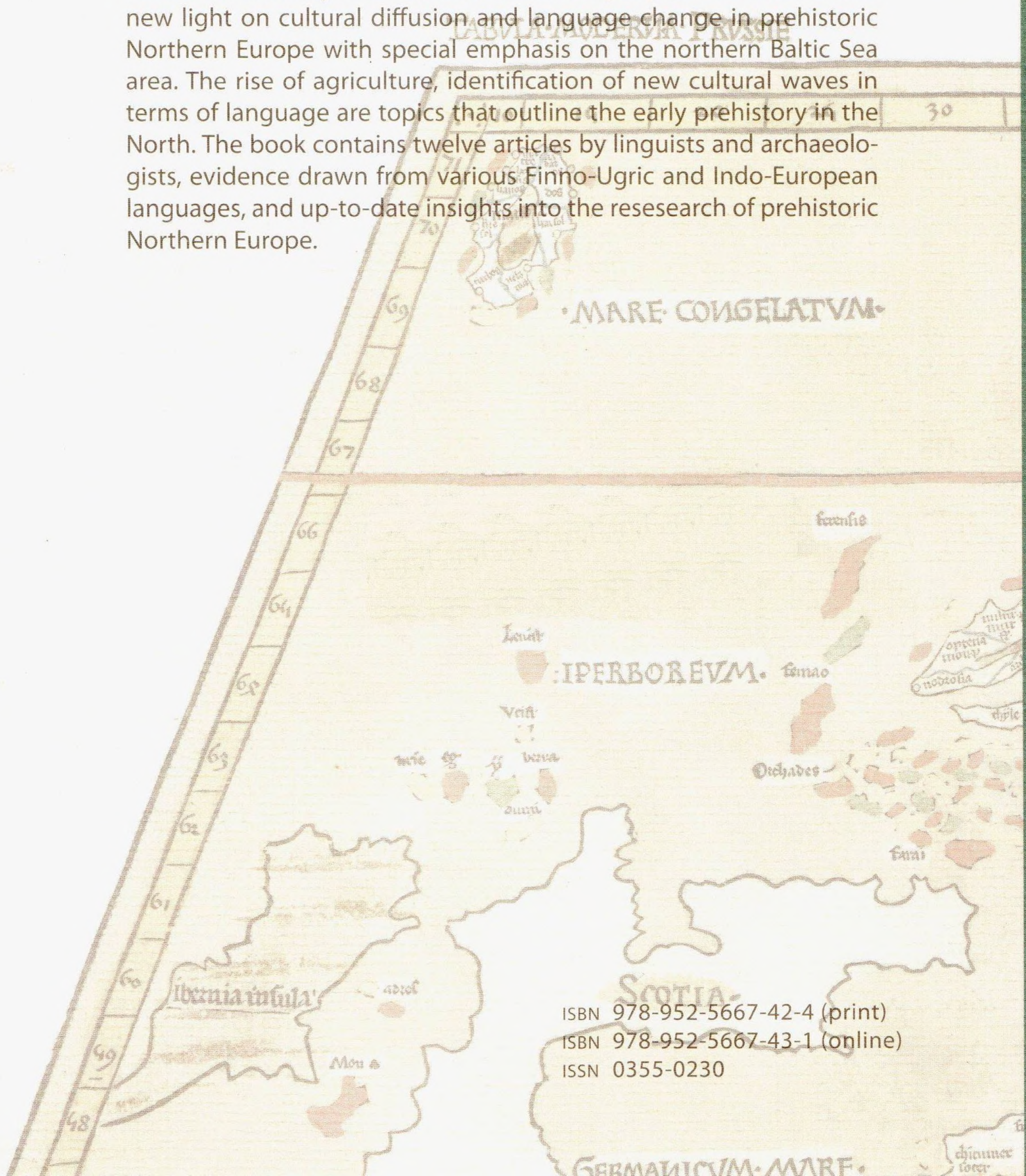

ISBN 978-952-5667-42-4 (print)
ISBN 978-952-5667-43-1 (online)
ISSN 0355-0230